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The ADL Registry and CORDRA—Volume 2: Registry Overview and User's Guide

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The ADL Registry and CORDRA

Volume 2: Registry Overview and User's Guide

April, 2010

Advanced Distributed Learning

Dedication

The Institute for Defense Analyses and the Advanced Distributed Learning Initiative dedicate this document set to the memory of Philip Dodds. He provided leadership, vision, and guidance that made the ADL Registry possible. His many contributions to distributed learning and content sharing are of immense significance and abiding value.

The ADL Registry and CORDRA

Volume 2: Registry Overview and User's Guide

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1 Introduction

The Advanced Distributed Learning (ADL) Registry is a Department of Defense (DoD)-sponsored and DoD-operated service for registering the existence, locations, and descriptions of digital resources (or objects) developed or acquired by the DoD and intended for use in distributed learning (training, education, and performance and decision aiding). The ADL Registry is a centralized service that manages the processing, storage, identification, and indexing of information about digital objects that are stored in multiple, independently managed, and variously located repositories. It allows local repositories to maintain control of their objects while sharing their existence and information about them – called metadata – with a wide community of potential users.

This document – Volume 2 of a five-document set – provides an overview of the ADL Registry and guidance for using the ADL Registry Web site. Volume 1 provides an overview of the ADL Registry initiative, including history, high-level requirements, design assumptions, and rationale. Volume 3 provides detailed technical information about the ADL Registry. Volumes 4 and 5 provide more detail on the Content Object Discovery and Registration/Resolution Architecture (CORDRA™) and information about value-added services and tools, respectively.

The ADL Registry Web site resides at

http://adlregistry.adlnet.gov

Additional information about the ADL Registry can be found at

http://www.adlnet.gov/Technologies/adlr/default.aspx

NOTE – This document uses the term "digital object" to refer to resources that may be registered in the ADL Registry. In addition to objects that contain content for display to the learner (content objects) and objects with specific educational and training goals (learning objects), a digital object, as used here, may be anything of value to the learning community, such as a simulation, mathematical model, teaching-strategy algorithm, glossary, technical manual, or style guide. A digital object may also be a collection of resources encapsulated in a package, such as a ZIP file.

2 An overview of the ADL Registry

The ADL Registry is the first publicly available instance of CORDRA. It was developed for the DoD by a partnership between the ADL Initiative and the Corporation for National Research Initiatives® (CNRI). This section provides an overview of the ADL Registry, including its structure and functionality, participant roles and participation requirements, and an introduction to the Handle System® [8][1], which supplies unique, persistent identifiers called *handles* for digital objects and a means for locating them through a registry.

2.1 High-level description

The ADL Registry provides centrally searchable information – metadata records – that describe digital objects. Each record provides sufficient detail so that searchers can find – or *discover* – objects according to specific characteristics. By using metadata for object discovery, the ADL Registry's search and discovery services identify relevant objects more precisely with fewer irrelevant results than the text-crawling processes used elsewhere.

After a digital object has been discovered, the ADL Registry allows it to be located – or *resolved* – through the use of a handle (see Section 2.6). Handles allow objects to be found despite changes in locations and other access characteristics likely to occur over their lifetime. In this way, handles are unlike other resource locators that bundle object locations and identifiers together and can lose an object if it is moved, for example, from one repository to another. In short, the ADL Registry allows developers to register learning assets and other digital objects to enable and facilitate their discovery, location, and reuse.

As shown in Figure 1, independently managed object repositories exist throughout the DoD. These repositories may have no direct affiliation with one another. Their implementation, management, usage, and access policies may differ widely. ADL Registry participation does not impact these aspects of locally controlled repositories but does require a consistent method for registering metadata records.

[1] The numbers in brackets correspond to those in the bibliography in Appendix A.

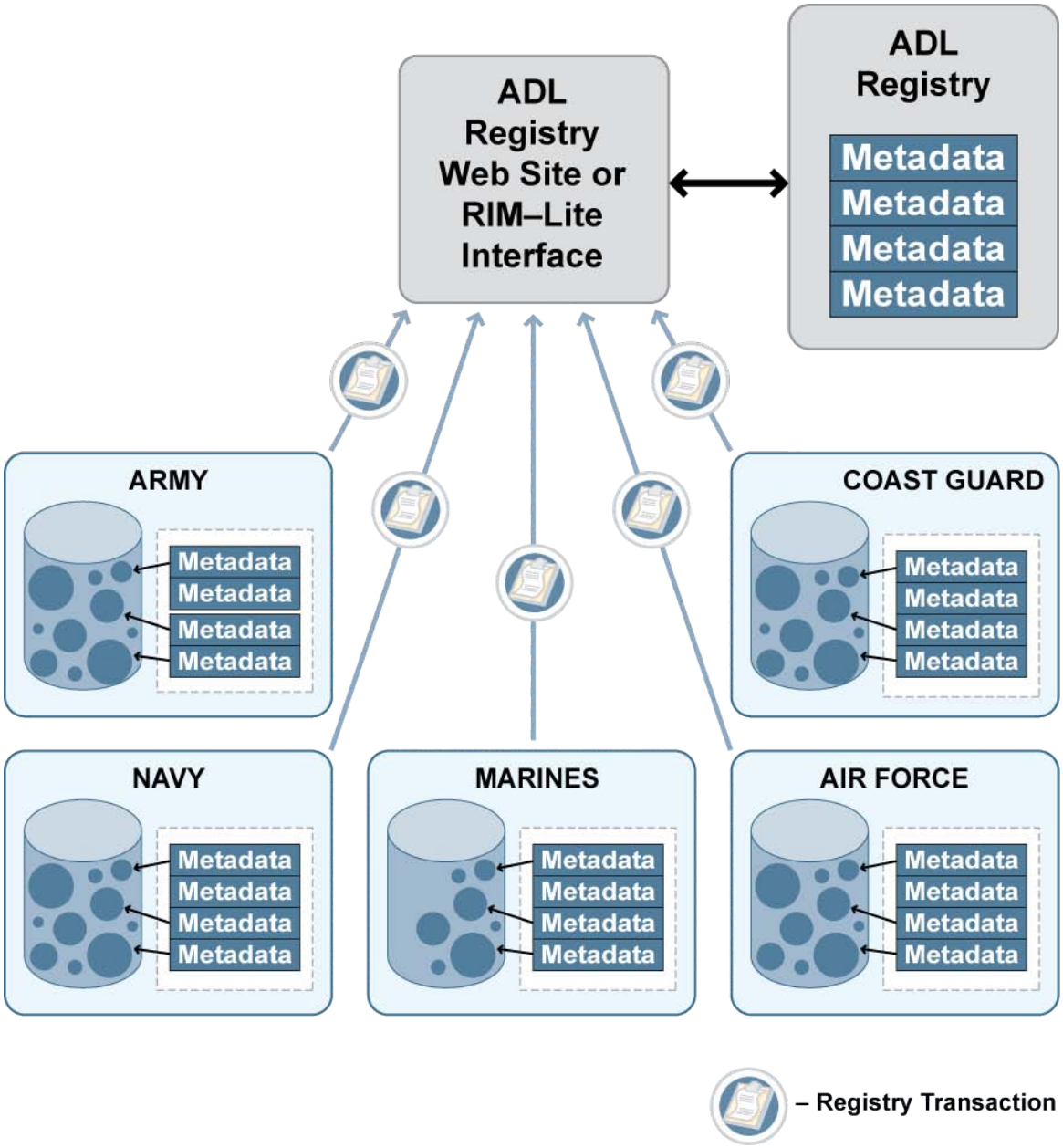

Figure 1– Multiple independent object repositories

As Figure 2 suggests, the ADL Registry allows DoD components, approved non-DoD federal activities, and associated contractors that operate government-owned repositories to submit metadata records about digital objects that they create or acquire. Submitting a metadata record constitutes registration of the object it describes. Metadata records use the Institute of Electrical & Electronics Engineers (IEEE) Learning Object Metadata (LOM) format [4], which is a standard, internationally recognized model for storing and retrieving metadata about objects used in learning applications. The records are encoded as Extensible Markup Language (XML™) [9] documents.

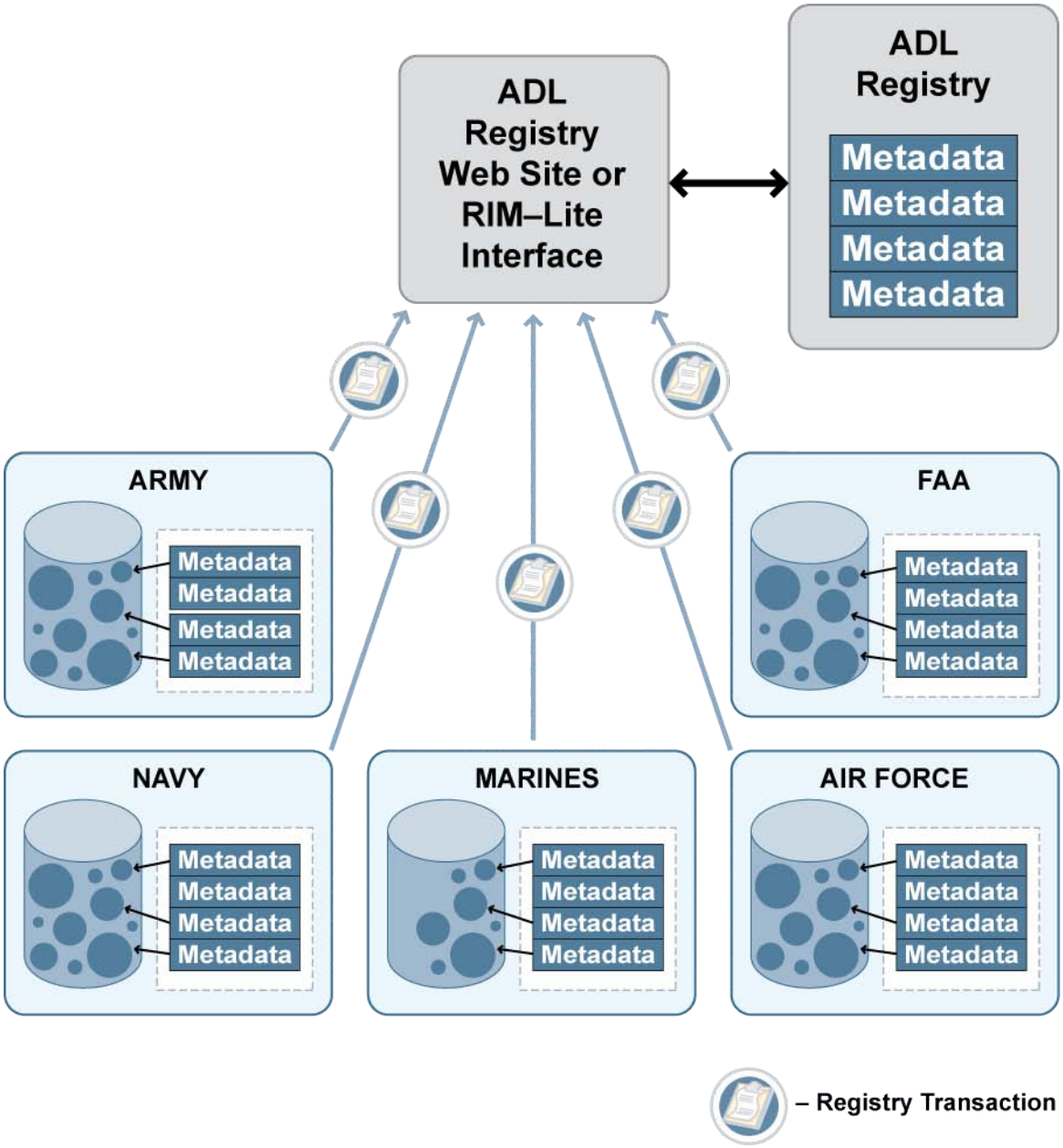

Figure 2 – Repositories submit metadata about objects

Metadata records are submitted either manually through the ADL Registry Web site or automatically using tools designed to access a registry interface mechanism (RIM) called RIM–Lite (see Volume 3). Digital objects are assigned unique identifiers. A single object may have multiple metadata records associated with it through its identifier.

The ADL Registry uses CNRI's Handle System [8] for identifying digital objects (see Section 2.6). The ADL Registry accepts the registration of objects already identified by handles, in which case those handles are managed externally to the ADL Registry project. The ADL Registry also allows registering objects not currently identified by handles and provides a handle service, eliminating the need for organizations to install and maintain their own handle servers.

As shown in Figure 3, the ADL Registry Web site lets users search metadata in the ADL Registry. Search results may resolve directly to digital objects or to a means of retrieval that requires local access and authentication privileges, which are the responsibility of the local repository. The ADL Registry can, then, provide global visibility for an object while preserving local control over its access.

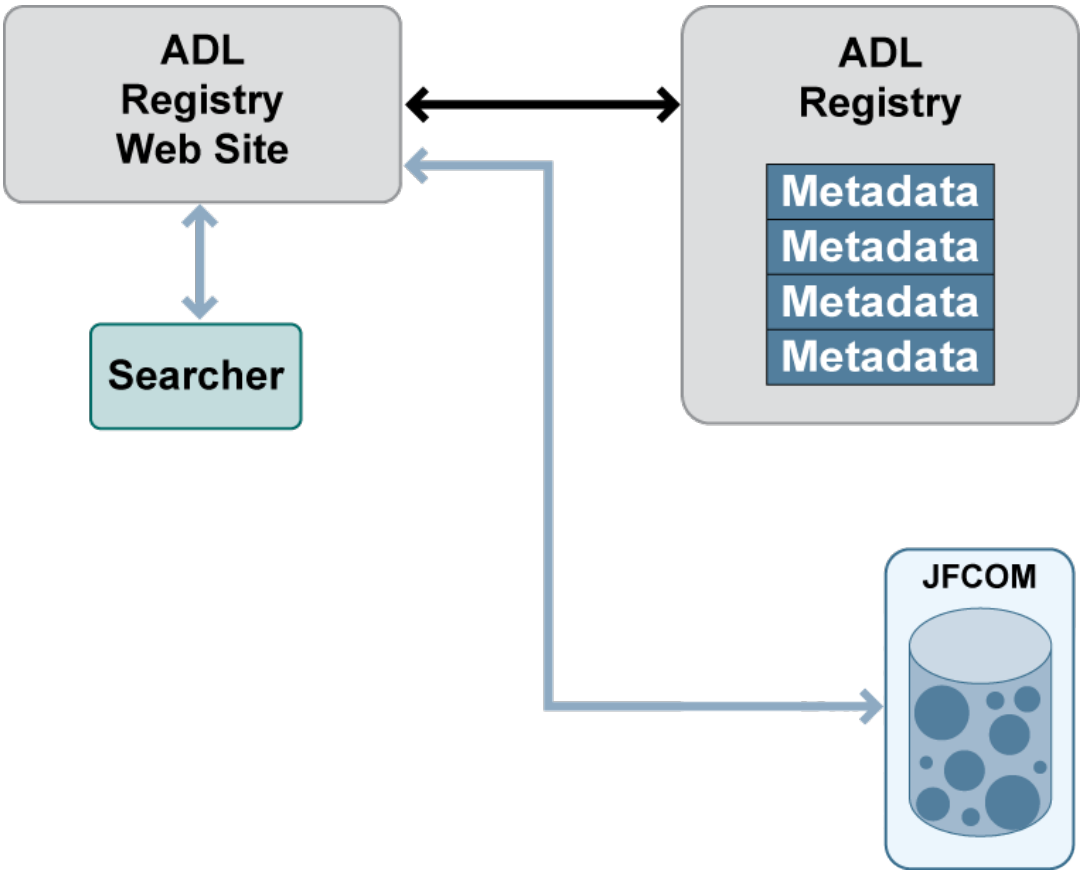

Figure 3 – Metadata about digital objects may be searched by anyone

The ADL Registry provides a means for many independently located and managed object repositories, each with its own local policies and procedures, to register information about digital objects so that the objects can be discovered, resolved, and accessed. The ADL Registry is an improvement over alternative approaches to search, discovery, and resolution in that

- It allows objects to be managed locally, thus creating minimal impact on repository policies and procedures.
- It provides a robust set of services, including the management of metadata records and persistent object identifiers.
- It is based on a scalable architecture that can support many separate repositories.
- It can be associated – or federated – with other registries over time to increase the depth and breadth of searches.
- It allows objects to be intentionally made visible by approved contributors and more precisely discovered than other more general Web searching strategies that index all objects, regardless of their nature or quality.
- It allows objects that cannot be accessed by general Web search engines to be available for search and discovery while protecting access to them.
- It supports tools and services for automating many registration and maintenance processes to both register objects and keep their information current.

In short, the ADL Registry's architecture and implementation address the requirements and challenges involved in developing systems intended to discover, locate, and access digital objects in repositories across a wide variety of domains.

2.2 Participant roles and descriptions

As shown in Figure 4, the ADL Registry project involves multiple participants playing different roles in repository and registry operations. Their roles and responsibilities are summarized below.

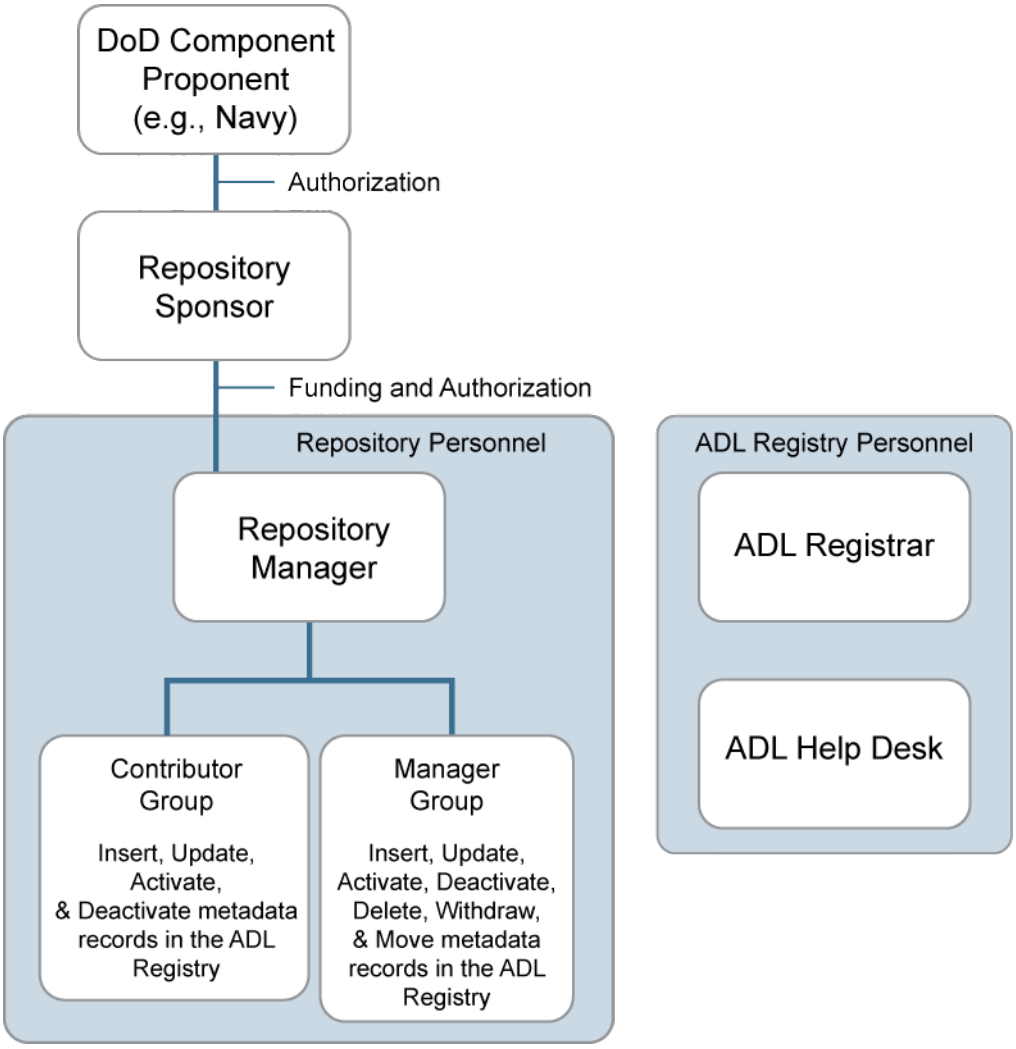

Figure 4 – ADL Registry project participants

ADL Registry user: Anyone accessing the ADL Registry to search for digital objects using the ADL Registry Web site or similar services.

Repository manager: An individual who is responsible for the day-to-day operation and maintenance of a repository. Responsibilities with respect to the ADL Registry include

- Identifying individual account holders and verifying their contact information.
- Ensuring that metadata describing repository objects is provided to the ADL Registry.
- Ensuring that metadata provided is accurate, complete, and timely.
- Ensuring that the repository staff is trained.

Contributor group member: Anyone associated with a participating repository and who is authorized to contribute metadata to the ADL Registry. Contributor group members can insert, update, activate, and deactivate metadata records (see Section 5).

Manager group member: A contributor who has additional rights to delete, withdraw, and move metadata records (see Section 5).

Repository sponsor: The person or office within DoD responsible for a repository's existence.

DoD Component Proponent: The person or office within DoD responsible for approving a repository's existence, per Department of Defense Instruction (DoDI) 1322.26 paragraph 5 [2].

ADL Registrar: The ADL official, working at the direction of DoD, who grants access privileges and rights to the ADL Registry according to DoD policies. The ADL Registrar is responsible for

- Authenticating and registering repositories.
- Acquiring additional information as needed and to determine access rights for a contributor or manager group member.
- Creating accounts for individual participants and ensuring they are assigned to appropriate groups.
- Providing user names and passwords.

ADL Registry Help Desk: The help desk is responsible for

- Providing help with technical questions and Web site issues.
- Assisting in registering and discovering digital objects.
- Providing training for new account holders.

2.3 Participating repositories

A participating repository is a local system for storing, maintaining, and accessing digital objects and one that has registered to participate in the ADL Registry project. While no specific implementation is assumed, certain capabilities are required to participate with the ADL Registry. These include

- A means to create, register, and maintain metadata records in the ADL Registry.
- A means to electronically access registered digital objects within the repository or obtain non-digital objects.
- Approval to participate in the ADL Registry by the appropriate DoD Component Proponent.

Typical participating repositories are government owned and either government or contractor operated. In some cases, a government-owned repository may be both hosted and operated by a contractor.

A participating repository may be implemented in any way as long as specific capabilities and external interfaces are provided. At a minimum, a repository must be able to store digital objects and make them available for reuse, either by direct access or by providing information about how to access them. The repository also must be able to provide metadata records to the ADL Registry. ADL places no requirements on how objects are stored and represented in repositories.

The requirement that a repository must be able to provide metadata records suggests that such records reside somewhere in the repository. Although this is not a specific requirement, because of the value and cost of metadata, the need to keep such metadata synchronized with evolving versions of objects, and the need for internal life-cycle management, it is assumed that metadata typically will be created during the object development process and stored somewhere in a repository.

2.3.1 Repository manager role

As implied by Figure 5, ADL assumes that a repository manager is responsible for the operation and maintenance of a repository. The repository manager manages the storage of digital objects in the repository, implements policies for security, access, and other local business rules, and is the primary contact for repository administration.

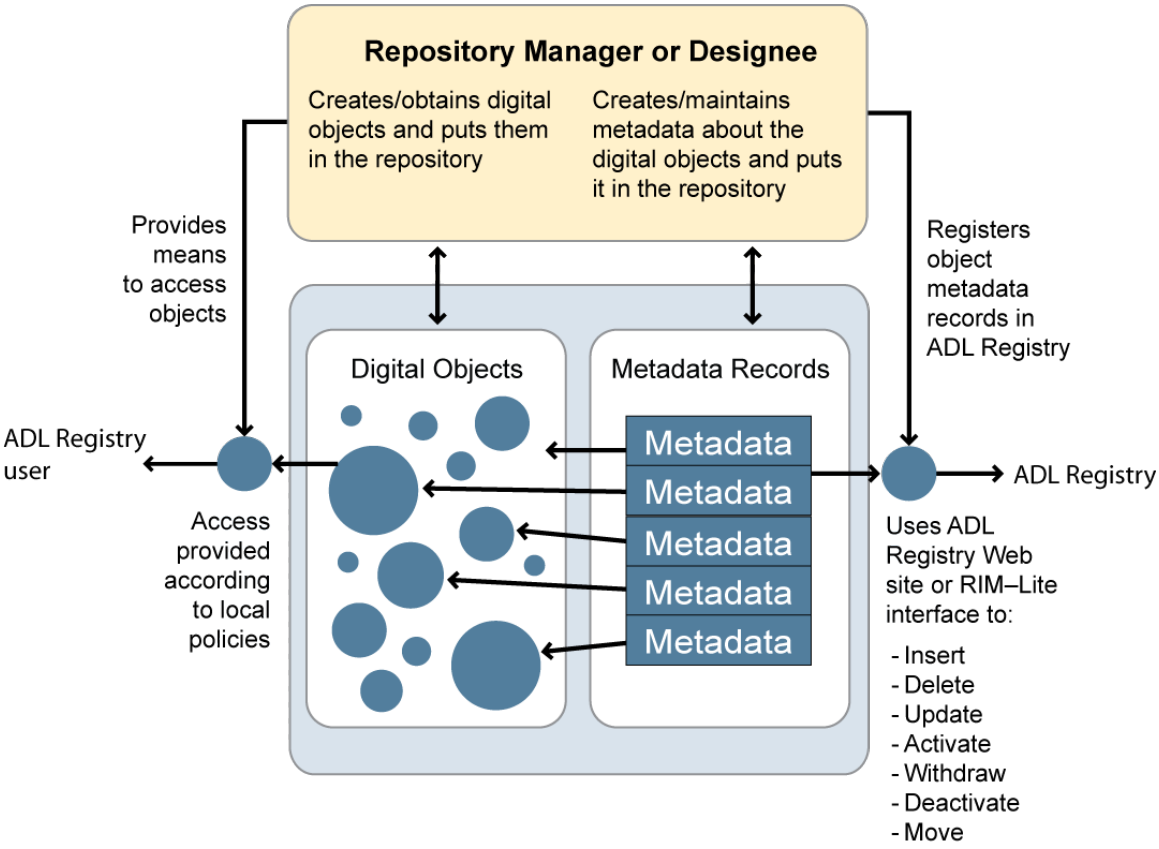

Figure 5 – Repository manager responsibilities

To participate in the ADL Registry, a repository manager must obtain approval from the DoD Component Proponent and register the repository with the ADL Registry (see Section 3.2). After the registration is approved by the ADL Registrar, the repository manager determines who is allowed to contribute metadata to the ADL Registry and whether they should be members of the contributor group or the manager group. The manager then registers them using the ADL Registry Web site (see Section 3.3).

2.3.2 Repository contributions

Once a repository has been approved and registered, metadata records may be contributed to the ADL Registry. These contributions must adhere to the ADL Registry LOM schema and be encapsulated in accord with the ADL Registry transaction specification (see Volume 3).

As discussed earlier, the digital object's location is part of the information provided to the ADL Registry. This location may point either directly to the object or to a repository service that provides access to the object. If local security and access policies prevent direct access to an object, the repository manager is required to document how it may be obtained, for example, by displaying a Web page with requirements and contact information. Although no specific access mechanism is required, repository managers should provide a simple automated way to deliver objects to ADL Registry searchers. Such a mechanism may require approval and authentication for accessing objects, but it should make objects available as easily and automatically as possible.

Digital objects retrieved from a repository may be of any format or type. The object's metadata record includes information that identifies the formats of its contents. One form that objects may be stored in is a Shareable Content Object Reference Model (SCORM®) package [7]. A SCORM package is a compressed ZIP file containing information about the organization of the file's objects and all related files needed to display them. Such packages are self-describing through the use of an internal list of contents (i.e., a manifest). They may consist of one simple object or a collection of objects and supporting files.

NOTES:

1. When an object is registered, several types of related Uniform Resource Locator (URLs) may be provided (see Section 3.1.2.1). If the object is not available for direct download via an object URL, information on how to obtain the object should be provided via a contact URL. A repository should not register objects that cannot be obtained in some way that is under direct control of the repository.

2. The ADL Registry LOM schema is available at

   http://hdl.handle.net/2000.2/adlreg-lom

2.3.3 What to register

DoDI 1322.26 [2] requires that all acquired or newly developed SCORM packages and, by implication, SCORM objects (SCOs) include metadata, be stored in a repository, and be registered in the ADL Registry. However, this requirement does not imply that only SCORM packages can be registered.

DoDI 1322.26 requirements aside, developers are encouraged to register digital objects that others could share, reuse, or repurpose. The scope of what is registered may vary. It may, for example, be a course, a module, a unit, a lesson, a topic, or a single asset, such as a graphics file. Developers may register a single object in a package, or a package may contain several objects with a complex sequencing structure. They may also register a simulation, video, animation, or image that could be used by others.

Some topics, such as the following, seem more likely to be shared, reused, or repurposed:

1. Objects that are of interest to various military Services or other organizations within DoD, such as those that concern
    - Combating trafficking in persons
    - Combat care for blast injuries
    - Tactical: patrolling, defensive operations.
2. Objects that are not DoD or government specific, such as those that concern
    - Accounting
    - Leadership
    - Medical/dental/pharmaceutical
    - Regulatory compliance, such as job safety and sexual harassment.
3. Objects that are governed by federal rather than just DoD policy, such as those that concern
    - Transportation of hazardous materials (HAZMAT)
    - Federal Acquisition Regulations (FARs)
    - Air Traffic Control (ATC).
4. Other objects that could be useful to others, such as those that concern
    - Non-weapon-system-specific topics
    - Principles of navigation (flight or naval training)
    - Vehicle maintenance.

5. Any guidance that might be useful to others and that could be packaged in an interchangeable way [e.g., a Portable Data Format (PDF) file], such as
    - Style guides
    - Glossaries
    - Technical manuals.

While the ADL Registry focuses on digital objects, it also permits the registration of objects that are not available for downloading. Such objects might include printed books or materials available on compact disks (CDs). Such objects may be registered by submitting the same descriptive metadata that would be submitted for downloadable objects. ADL recommends that the location of such an object resolve to a Web page that gives information about how to obtain that object.

NOTE – The ADL Registry currently does not support the registration of classified objects even if the metadata itself is unclassified.

2.4 ADL Registry structure and functionality

As stated previously, the ADL Registry is a centralized service that manages the processing, storage, identification, and indexing of information about digital objects that are stored in multiple, independently managed, and variously located repositories. The ADL Registry *does not* store objects. It only stores (and indexes) metadata that *describes* objects located and managed elsewhere. This distinction is important and sometimes causes confusion. This approach provides the means to search for a vast number of objects, with minimal impact on local systems.

Although a detailed understanding of the inner workings of the ADL Registry is not required to search for or register digital objects, it is helpful to understand the ADL Registry's key components, which are shown in Figure 6.

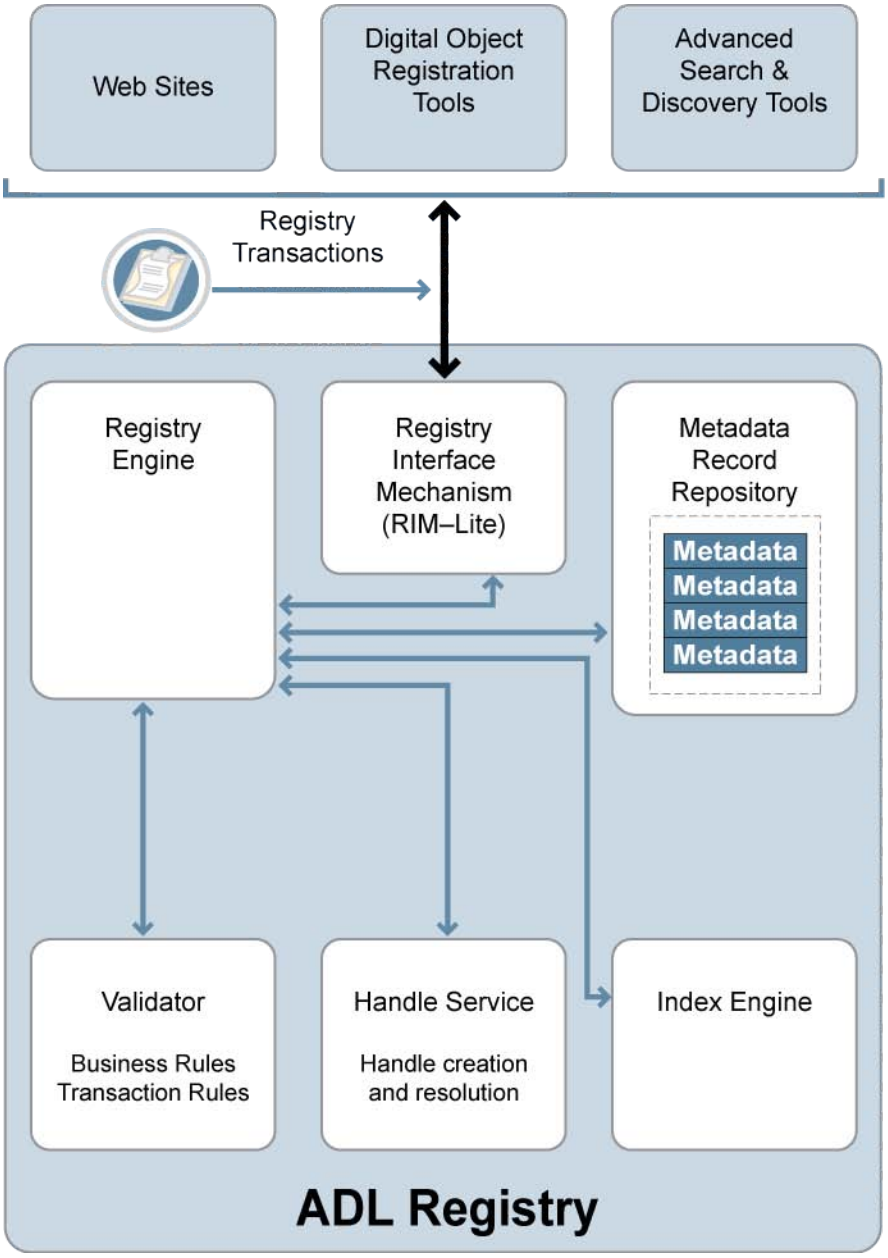

Figure 6 – ADL Registry functional modules and interfaces

The ADL Registry has the following major components:

Registry engine: Manages information that is sent to and from the ADL Registry through the ADL Registry Web site and the RIM–Lite interface. The registry engine processes information and routes it internally within the ADL Registry. It is responsible for all operations inside the ADL Registry, including authentication and authorization of contributors.

Validator: Ensures that Web site contribution-form information and XML files submitted during the registration transaction process are valid and properly formed. It also tests incoming information against a set of rules to verify that incoming information has been created correctly.

Metadata record repository: Stores metadata records submitted by object repositories. The records include unique identifiers for internal management within the ADL Registry that are created using the handle server.

Index engine: Indexes metadata records to make them available for registry searches.

Handle service: Manages the creation and maintenance of unique identifiers, or handles, and provides a resolution service to obtain and resolve object locations from the handles. The handle service can administer and resolve both internal registry handles and external object handles. The ADL Registry also uses handles for identifying and locating associated local registries and for authenticating and authorizing users. (See Section 2.6 for more information about the Handle System.)

Registry Interface Mechanism (RIM–Lite): The external access point to the ADL Registry for Web sites and registry tools (see Volume 3). Web site developers can use RIM–Lite to provide user access to the ADL Registry for both searching for and registering digital objects. Tool builders can use RIM–Lite to build custom applications, such as tools that automatically register digital objects residing in repositories and custom search tools.

2.5 The practice registry

Early in the ADL Registry program, it became clear that new and prospective contributors needed a way to practice registry transactions and see results before undertaking the registration of a large number of digital objects. Also, developers needed a way to test automation tools and interfaces without cluttering the operational registry with transient test information. Therefore, ADL created a separate practice registry that is functionally identical to the operational registry. Requests for practice registry accounts can be made through the ADL Registry Web site, which also provides access to the practice registry.

The practice registry, aside from its access procedures and policies, is identical to the operational registry. However, because it is a test-bed environment, metadata records need not point to actual digital objects and may be deleted periodically by ADL. Those who use the practice registry should maintain local copies of metadata records that they may later contribute to the operational ADL Registry. Data cannot be moved from the practice registry to the operational registry.

As shown in Figure 7, the practice registry uses handle prefixes that start with “4444” to distinguish between contributions made to the practice and operational registries. All such handles apply only to the practice registry. All handles with a prefix that starts with “100.50” apply only to the operational registry (see Section 2.6).

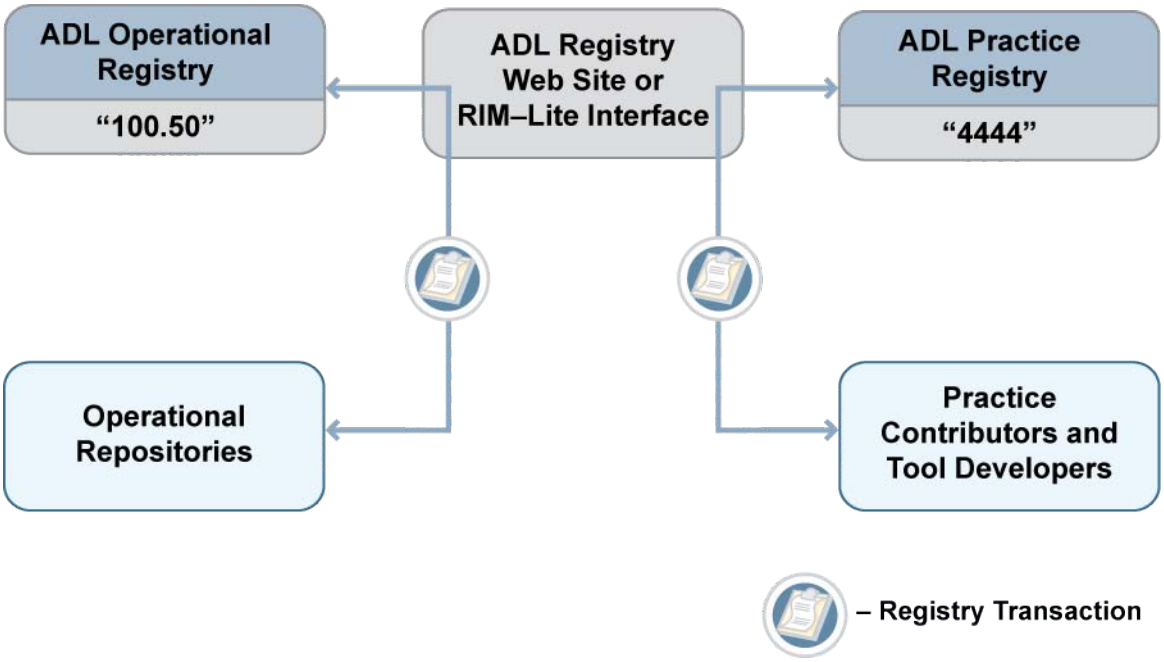

Figure 7 – ADL operational and practice registries and their prefix identifiers

NOTE – Because the practice registry is also ADL's test bed for enhancements and debugging, it may be temporarily unavailable during ADL test cycles.

2.6 The Handle System

The Handle System [8] is used within the ADL Registry for discovery (identification) and resolution (location) of digital objects. While an in-depth understanding of the Handle System is not required to use or contribute to the ADL Registry, some may desire a basic understanding of what a handle is and how it is used.

The Handle System is a comprehensive system for assigning, managing, and resolving identifiers for digital objects and other resources on the Internet and other computer networks. It functions as a network-wide directory service, ensuring that object-identifier information remains current.

More specifically, the Handle System includes a set of open protocols, a namespace, and an implementation of the protocols. A computer system can store handles of digital objects in a distributed environment and resolve those handles into the information necessary to locate and access the objects. This information is changed, as needed, by the Handle System to reflect the current state of the object without changing the handle itself, which persists over changes of location and other information.

As shown in Figure 8, a handle consists of two parts: a prefix and a suffix, which is a unique local name. The names are separated by a "/". A handle may look similar to a URL. However, when an object's location changes, its URL must be changed accordingly, while a handle is persistent regardless of object location.

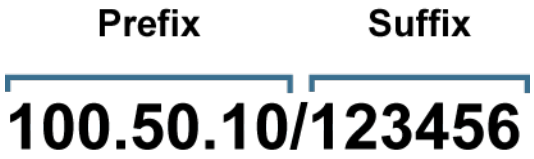

Figure 8 – An example handle

The prefix identifies the local handle service that is responsible for the handle. ADL can delegate the creation of prefixes by creating sub-naming authorities for DoD publishers who want to create handles for their own objects. Prefixes and suffixes can consist of alpha or numeric characters or a combination of both. Prefixes used by ADL Registry participants are numeric and begin with "100.50."

Each DoD component or approved non-DoD federal activity is assigned a single prefix consisting of 100.50 and two additional numbers, for example, 100.50.06. Prefixes for repositories add additional numbers, which may identify additional organizations in addition to the individual repository. For example, the National Defense University's prefix is 100.50.06.02. Each of the university's five colleges is identified by two additional numbers, for example 100.50.06.02.01.

3 Using the ADL Registry Web site

This section describes the step-by-step procedures that repository managers, digital object contributors, and registry searchers need to know to access and use all aspects of the ADL Registry Web site: http://adlregistry.adlnet.gov.

As previously mentioned, ADL provides a practice registry. Information in this section, with the exception of some registration requirements, applies to both registries.

3.1 Searching the ADL Registry

Anyone can search the ADL Registry for metadata about registered digital objects. No special access rights are required. To perform a basic search, simply go to the ADL Registry home page, shown in Figure 9, enter your search terms, and click *» search*. If you need to document a search, check *Request Receipt* below the search box or *Request Receipt for this Search* on the Search Results page (see Section 3.1.6).

NOTE – This section assumes that you want to search the operational registry. To search the practice registry, select *Practice Registry* on the ADL Registry Web site home page and then select either *Basic Search*, *Advanced Search,* or *Search by ID* from the drop-down menu. Depending upon your menu choice, a search page equivalent to one of those discussed below but applicable to the practice registry will be displayed.

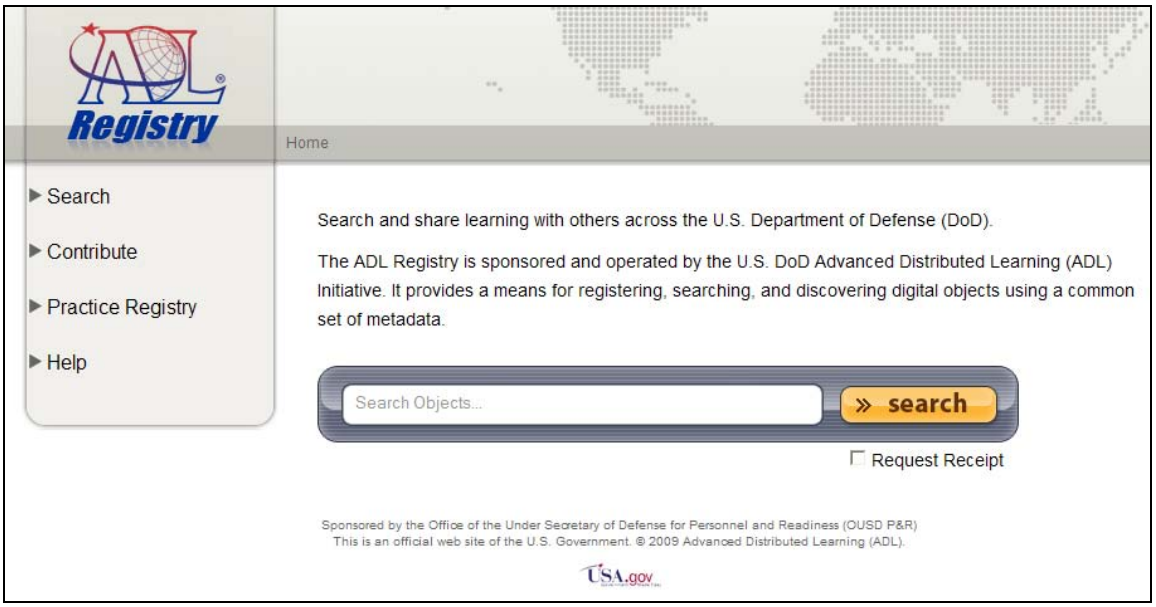

Figure 9 – The ADL Registry home page

3.1.1 Basic searches

By default, the ADL Registry performs a general text search of the metadata that describes registered digital objects. In a basic search, the term or phrase in the query is used to search the title, keyword, and description fields within the metadata. Advanced searches offer additional options (see Section 3.1.4 and Appendix B).

A basic search may be performed from the ADL Registry home page shown in Figure 9 or from the page shown in part in Figure 10, which is accessed by selecting *Search* in the main menu on the left of any ADL Registry Web page and then selecting *Basic Search* from the drop-down menu. Enter a term or phrase as shown and click *» search*.

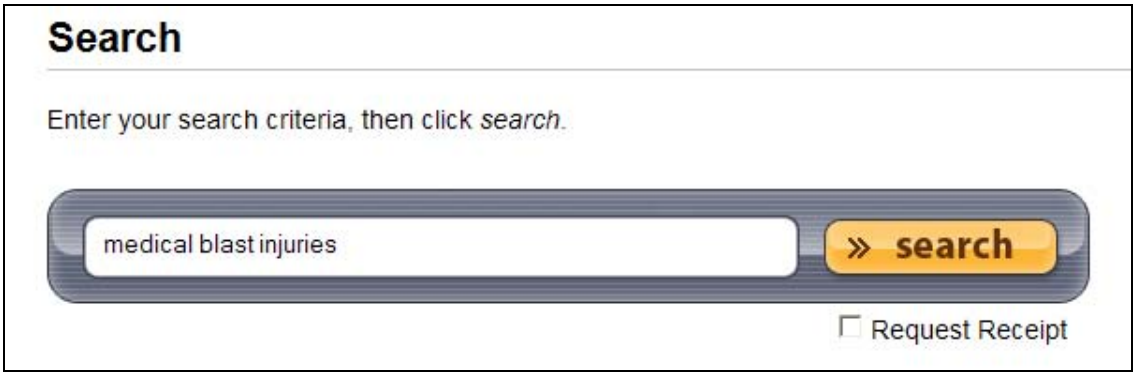

Figure 10 – A basic text search

When two or more terms are entered in the search field, the ADL Registry, by default, applies the Boolean operator "and" to the terms. In the example shown above, the ADL Registry will return *only* the metadata entries that contain *all* of the following terms: medical, blast, and injuries. Capitalization is not important. The ADL Registry returns all word matches regardless of upper or lower case.

3.1.2 Search results

Metadata is registered in the ADL Registry by approved contributors who know best how to describe their own digital objects. The ADL Registry provides a standard set of metadata that all contributors must use. Contributors may include additional optional metadata (see Appendix B of Volume 3). Unlike traditional Internet search engines that index and search the objects themselves, the ADL Registry searches only the metadata contained in the registry for an object. This search method improves accuracy and limits search results.

Search results are returned as a paginated list of entries. As shown in Figure 11, each entry contains the object's title and description and two options: a button to access the object (*get object*) and a button to view the metadata that describes the object (*view metadata*).

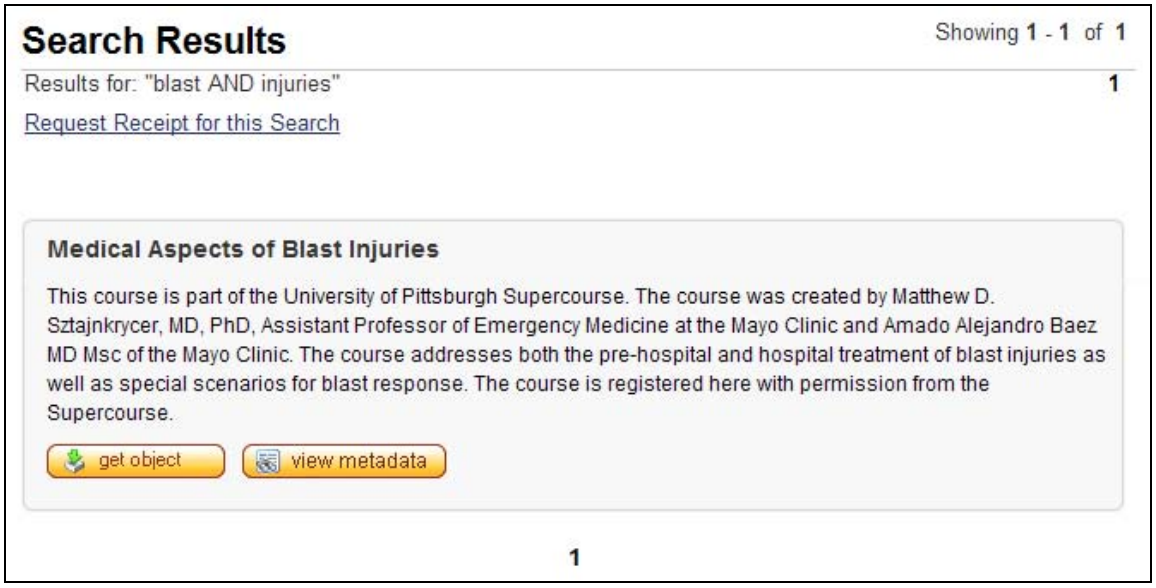

Figure 11 – Search results

3.1.2.1 Get object

The results of clicking *get object* will vary with the policies of the participating repositories. In the Figure 11 example, clicking *get object* displays a single URL of type object, as shown in Figure 12.

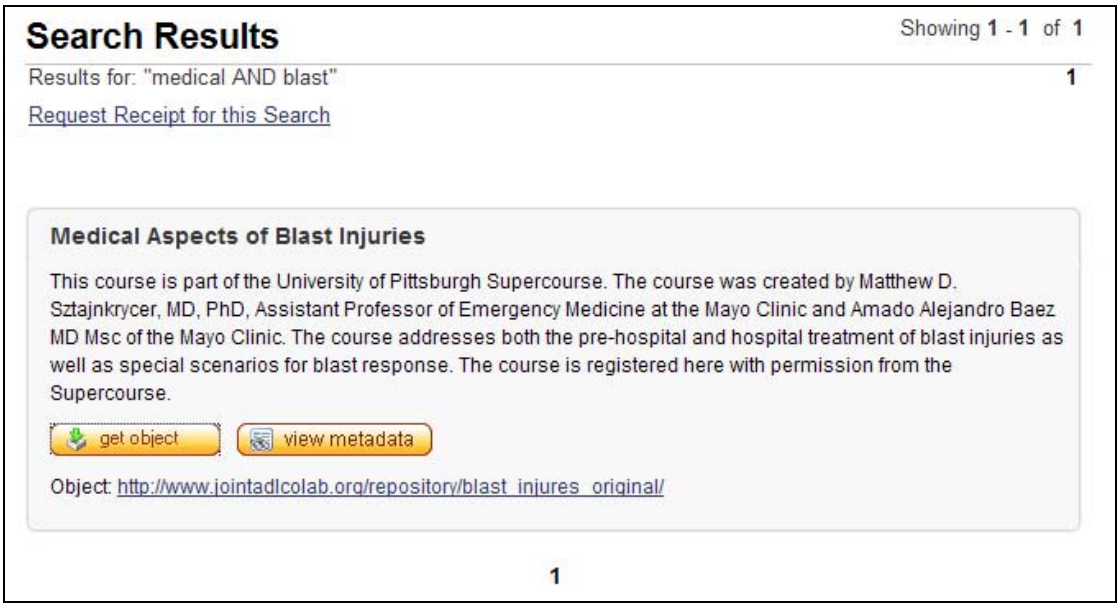

Figure 12 – Get object results

Depending on the information supplied by a participating repository, clicking *get object* for an entry may display one or more of the following clickable URL types:

- **Object**: This URL should point directly to the object for direct download.
- **Advertisement**: This URL may provide information, such as thumbnails, a short video clip, a sample SCO from a course, screen shots, or a bulleted list of features, to help you decide whether you want to acquire the object. It may also provide pricing and acquisition information when an object must be purchased.
- **Runtime**: This URL should allow you to launch an object, such as a course, or view an object, such as an S1000D document [6], before deciding whether to acquire the object. You may be required to present log-in credentials before viewing the object.
- **Contact**: This URL should provide information for a point of contact who can provide more information about acquiring the object.
- **Extended Metadata**: This URL should point to a metadata instance that supplements the metadata in the ADL Registry for an object. For example, it could point to a metadata instance that uses the MedBiquitous Healthcare schema.
- **Repository**: This URL should resolve to the home page or the log-in page for the repository that houses the object.

3.1.2.2 View metadata

As shown in the example in Figure 13, clicking *view metadata* opens a window that displays the mandatory metadata submitted to the ADL Registry by the contributor. You can use this metadata to help determine the suitability of the object for use or reuse.

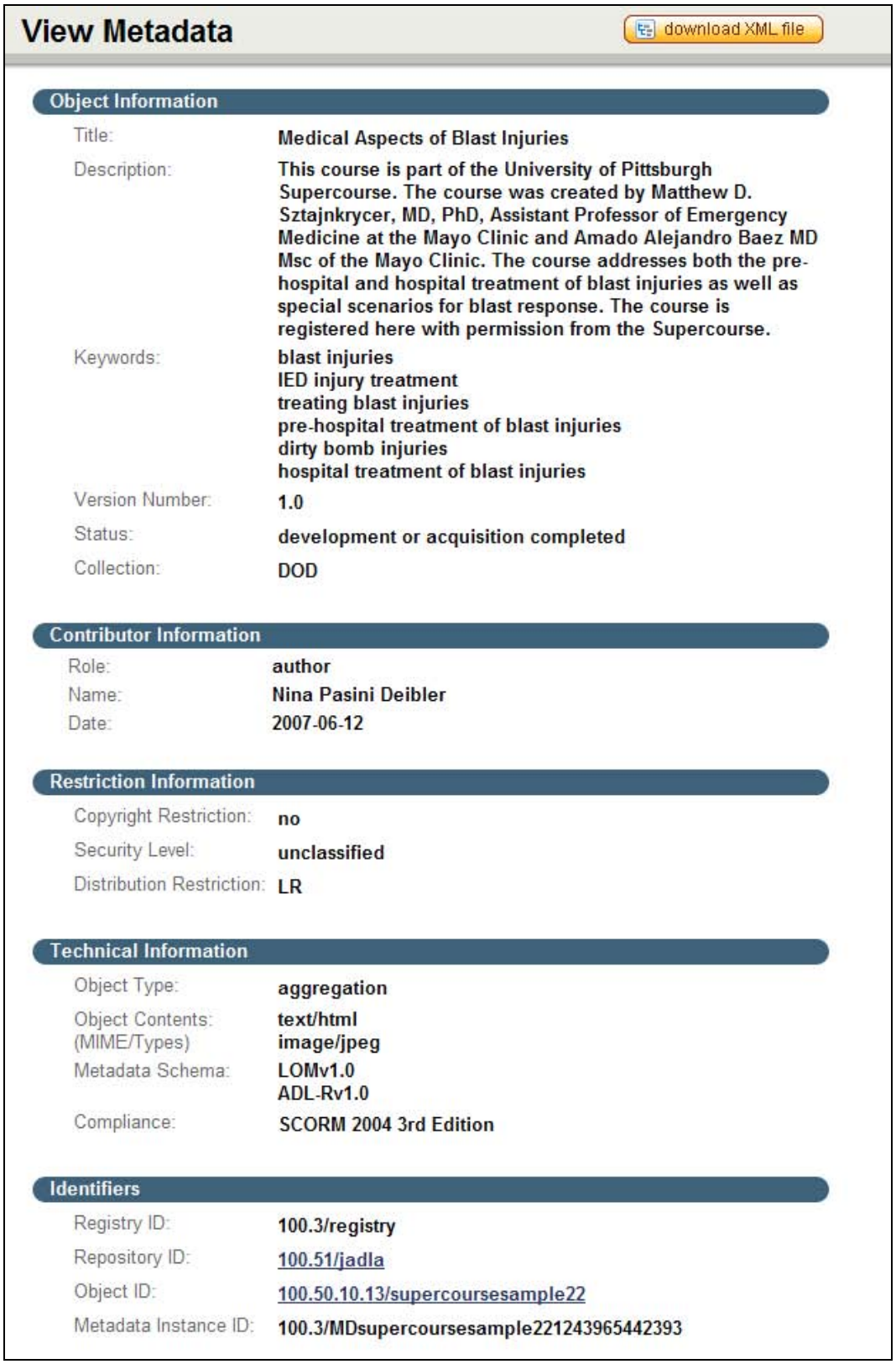

Figure 13 – View metadata results

From the view metadata window, you can click *download XML file* to open or save the XML version of the metadata. You might want the XML version to create a new metadata record for a particular digital object or to see the structure of the XML used in the ADL Registry. The XML version also includes any optional metadata supplied by the contributor. You might want to review this metadata to see if it provides additional information to help determine the suitability of an object for your requirement.

3.1.3 Specific-field searches

To search a specific metadata field, such as title or keyword, enter a field name followed by a colon, an optional space, and a search term as shown in Figure 14. The search will be limited to the specified field. Alternatively, you can use the advanced search form discussed in the following section and select a field from a drop-down menu. (See Appendix B for detailed information on specific field searches.)

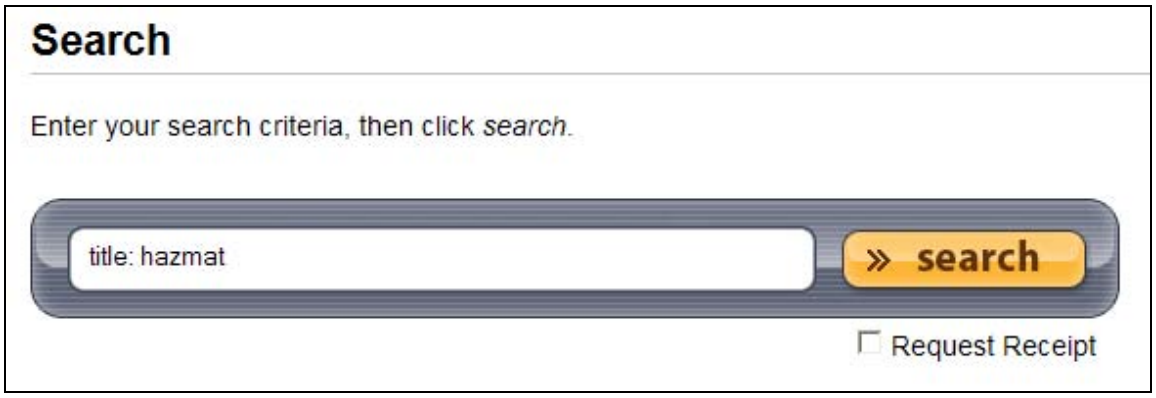

Figure 14 – A specific-field search

3.1.4 Advanced searches

To perform an advanced search, select *Search* from the main menu on the left of any page and then select *Advanced Search* from the drop-down menu. The example shown in Figure 15 searches for all digital objects related to navigation *except* stellar navigation.

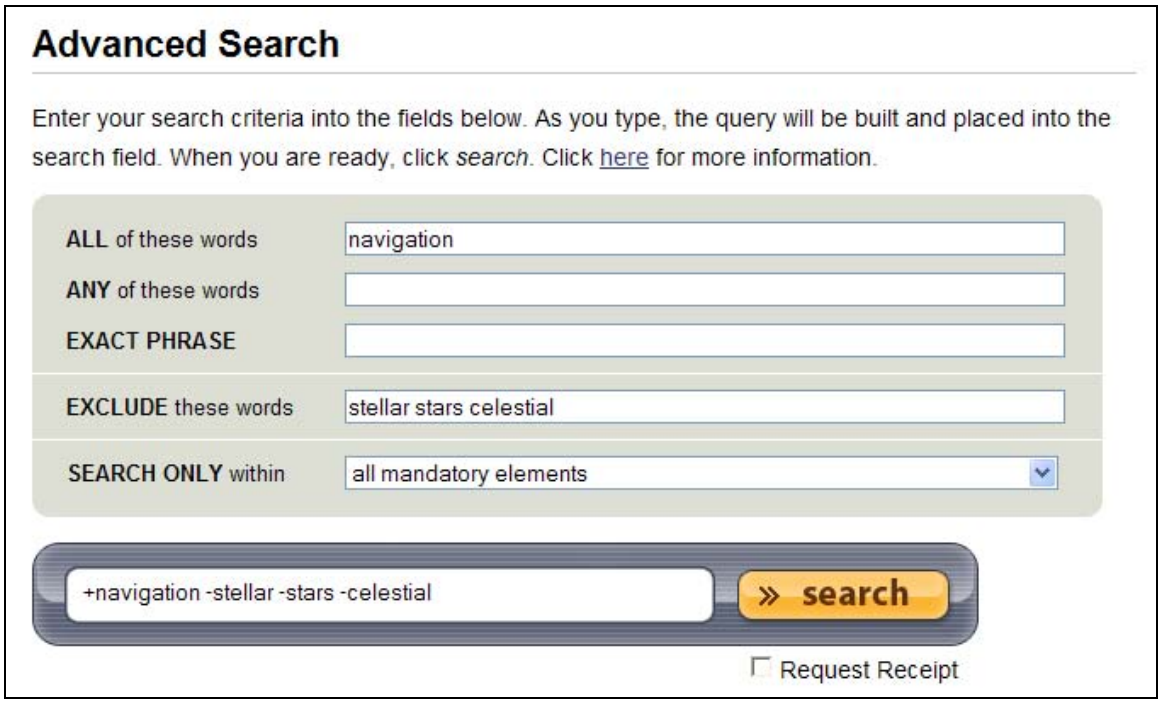

Figure 15 – The advanced search form

By default, *all mandatory elements* are searched. If, instead, you wanted to search only object titles, you would click the down arrow and select *title* from the drop-down menu. The search box is filled in automatically so that you can see exactly what your search looks like. (See Appendix B for detailed information on advanced searches.)

3.1.5 Searching by identifier

To search using a specific repository, object, or metadata instance identifier, select *Search* in the main menu on the left of any page and then select *Search by ID* from the drop-down menu. As shown in Figure 16, you could search for all objects contributed by the Defense Ammunition Center (DAC) using its repository ID.

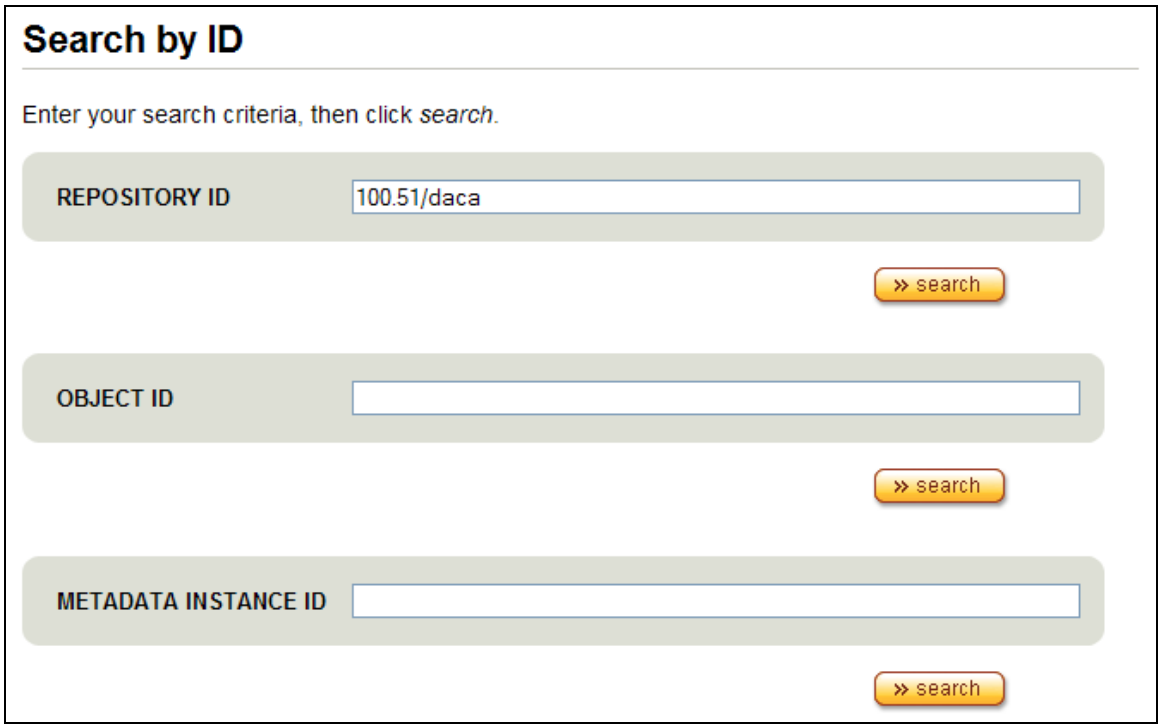

Figure 16 – Search by ID

Similarly, if you know the object ID or metadata instance ID for a particular metadata entry, you can enter that identifier in the appropriate field to find a specific metadata record. Repository, object, and metadata instance IDs are displayed on the View Metadata page (see Section 3.1.2.2).

NOTE – The repository ID is assigned by the ADL Registrar and provided to the repository manager. A directory of repository IDs is not available on the ADL Registry Web site. However, repository IDs for a specific object can be determined by viewing the metadata for the object.

3.1.6 Search receipts

The ADL Registry offers the ability to document your search. It also remembers the first page of a documented search. If you need to document a search, check *Request Receipt* from the search page before executing your search or click *Request Receipt for this Search* from the Search Results page. As shown in Figure 17, the search results will include a search-receipt number and a field for your e-mail address.

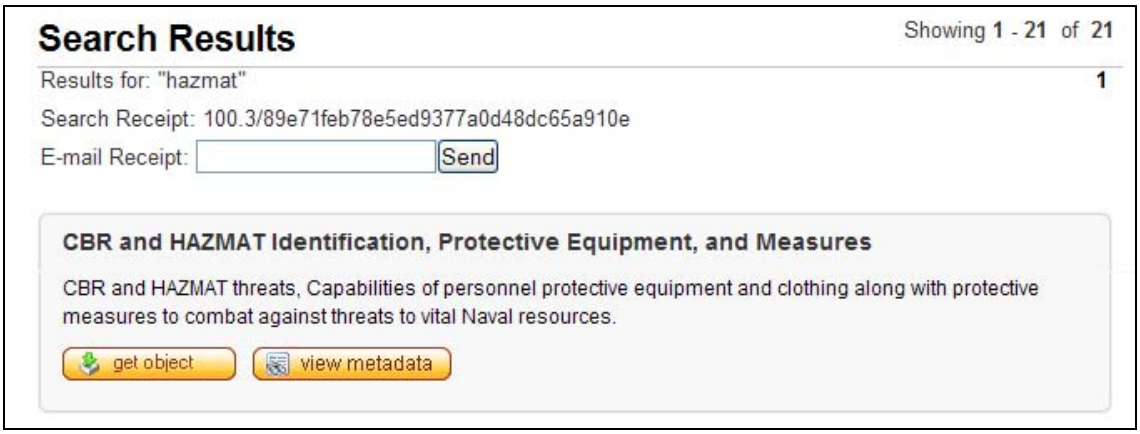

Figure 17 – Results including a receipt

To have the displayed search receipt e-mailed, enter your e-mail address and click *Send*. You will receive an e-mail containing information similar to the following:

> Search Receipt: 100.3/bb1e224716539dc5ecfdb7bae41e3bdd
>
> http://adlregistry.adlnet.gov/search/resolveSearchID.jsp?id=100.3/bb1e224716539dc5ecfdb7bae41e3bdd

To display the first page of the search results, you can click the URL in the e-mail or copy it into your browser. Alternatively, from the ADL Registry home page, you can select *Search* from the main menu on the left of any page and then select *Resolve Search Receipt* from the drop-down menu to display the form shown in Figure 18. Copy the search-receipt number into the field and click *Resolve*.

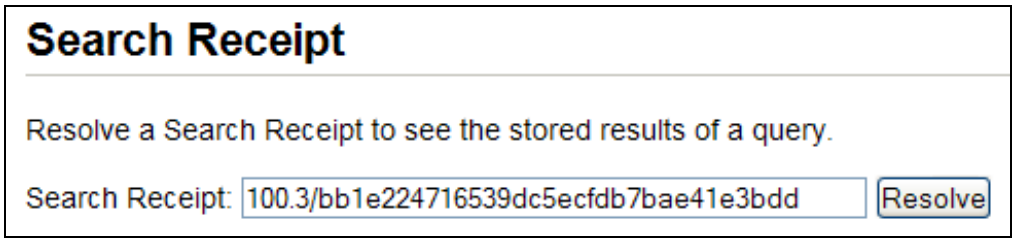

Figure 18 – The search receipt form

3.2 Registering a repository

Before a digital object can be registered, the repository in which it is stored must be registered. Select *Contribute* in the main menu on the left of any page and then select *Register Repository* from the drop-down menu. The repository registration form discussed in the following sections will appear. After filling out the form as described in the following sections, click *» submit repository registration* at the bottom of the form to send the information to the ADL Registrar.

NOTE – This section assumes that you are registering a DoD repository. After registration, you will have access to both the operational and practice registries. For a non-DoD repository, select *Practice Registry* from the main menu and then select *Register Repository* from the drop-down menu. The procedure is the same except that your repository and its contributors will be associated with the practice registry only, and you do not need to provide a DoD Component Proponent or sponsor organization.

3.2.1 The repository registration form

The repository registration form has several sections that capture information about a repository. It should be filled out by or under the direction of the repository manager. The following sections summarize the required information. Once the form has been completed, click *» submit repository registration* to send the form to ADL for processing.

3.2.1.1 Repository information

The repository information section of the form is shown in Figure 19. The repository title is your organization's name for the repository. The brief description should include what the repository is used for and by whom and any additional information that would be useful for the ADL Registrar to know about the repository's functions and capabilities. The location is the URL for the repository.

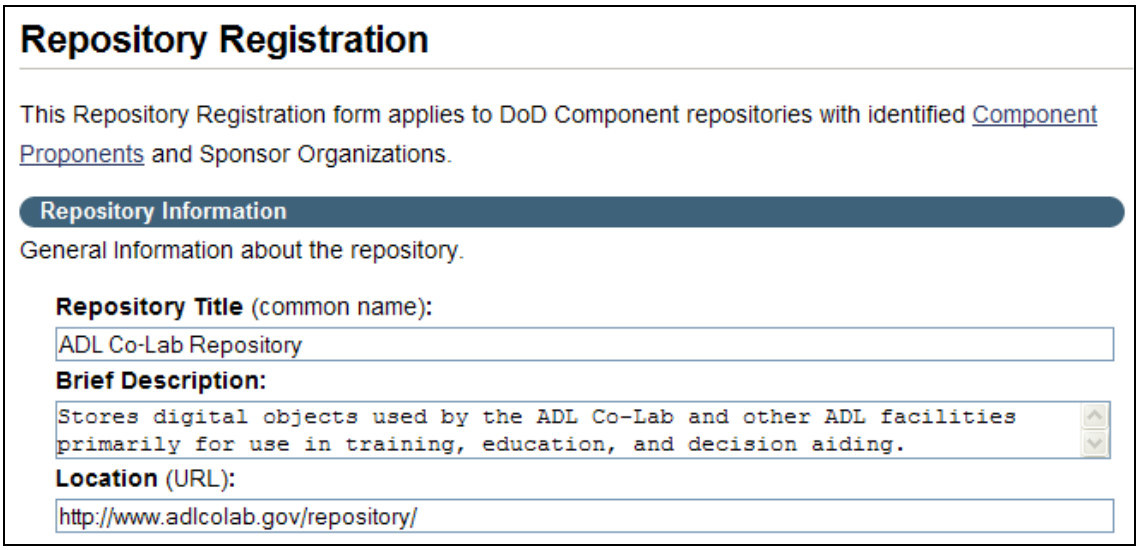

Figure 19 – Repository information

3.2.1.2 Repository sponsor information

The repository sponsor section of the form is shown in Figure 20. The repository sponsor is the DoD organization or office that authorized and either funded or approved funding for the repository. The sponsor organization and a point of contact must be supplied.

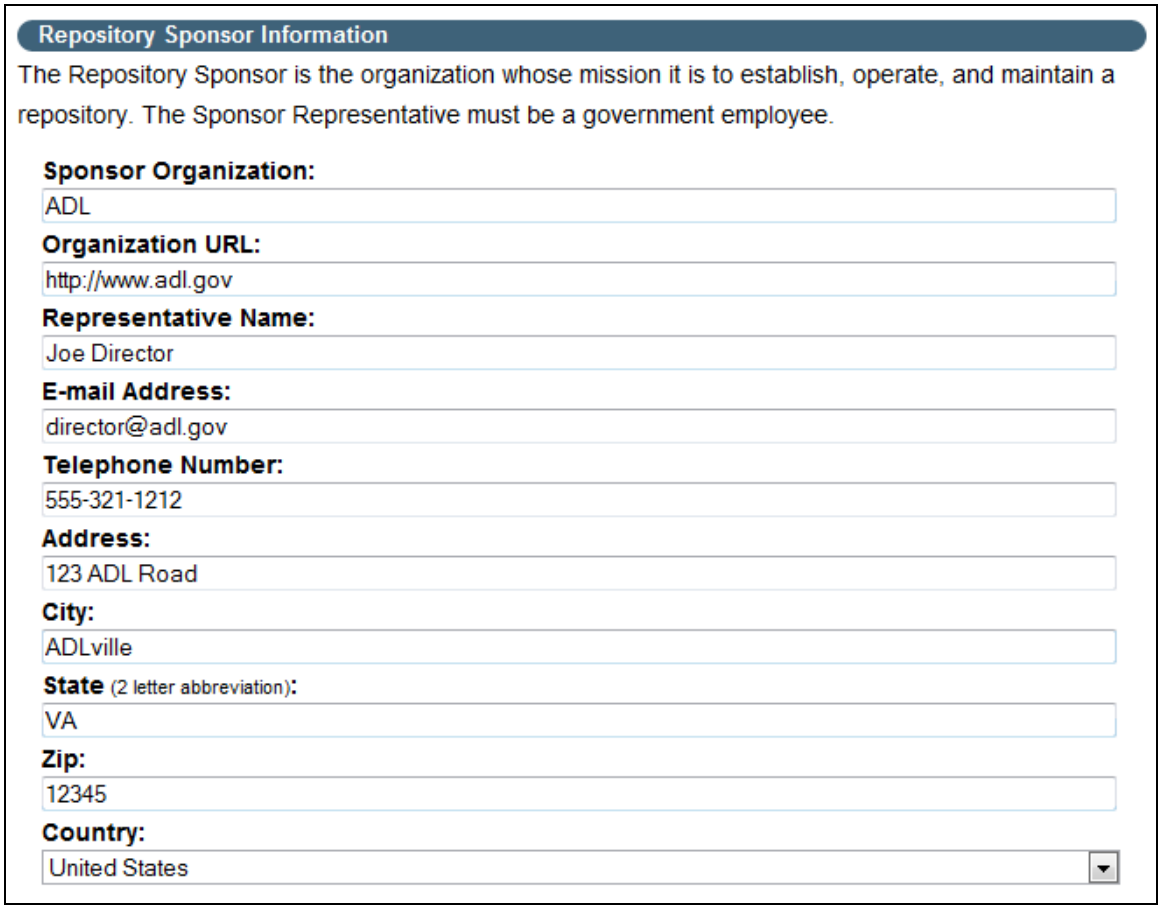

Figure 20 – Repository sponsor information

3.2.1.3 Repository manager information

The repository manager section of the form is shown in Figure 21. Enter the name and contact information for the individual who is directly responsible for the day-to-day management of the repository and who will be ADL's primary point of contact. This person will be responsible for authorizing repository personnel who may contribute to ADL Registry.

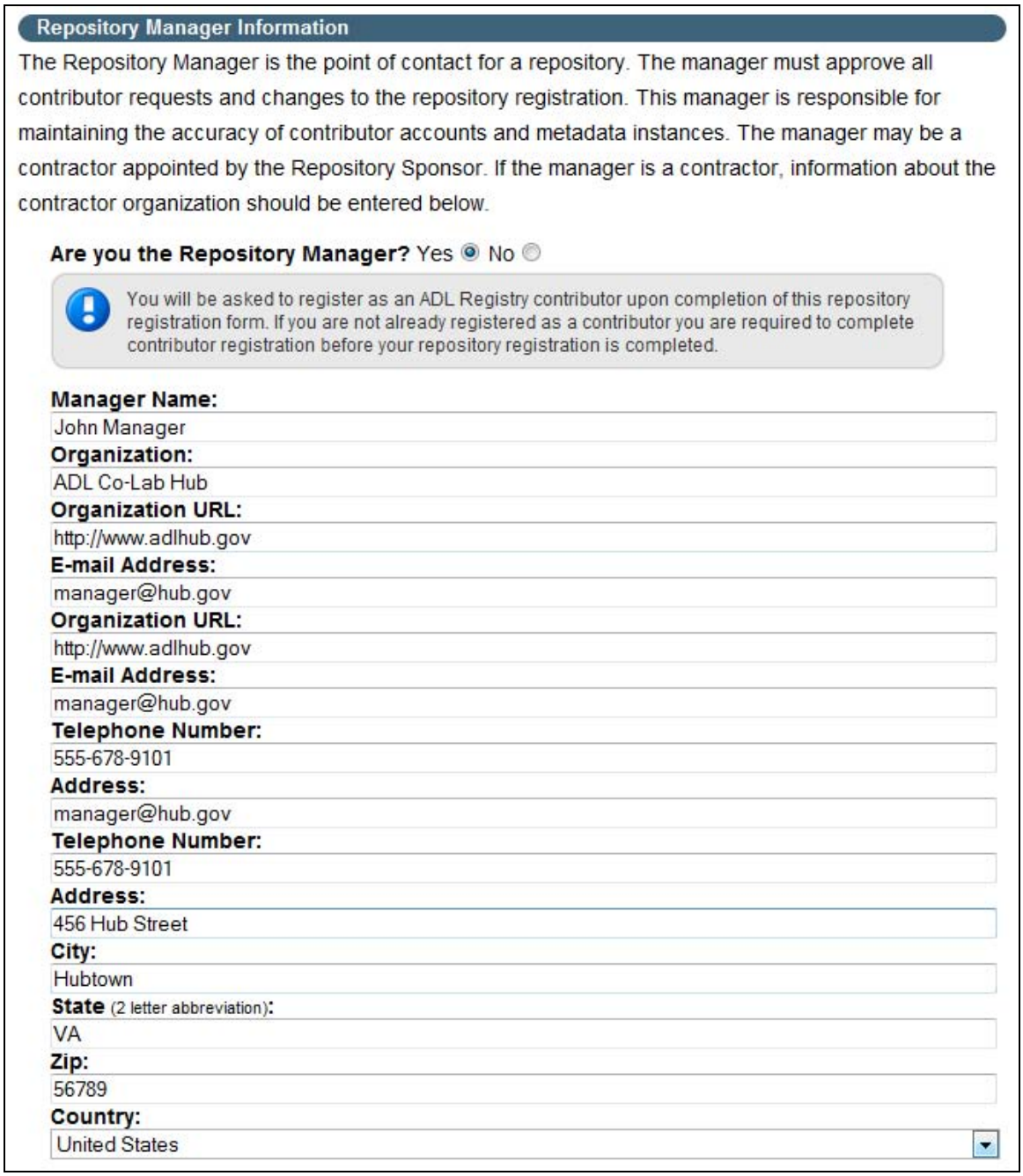

Figure 21 – Repository manager information

3.2.1.4 Component Proponent information

The component proponent section of the form is shown in Figure 21. The DoD Component Proponent is the person or office who authorized the existence of the repository in your DoD component. You may select one of the military Services from the drop-down menu or select *Not Listed* and enter the Component Proponent information. If the identity of the Component Proponent is unknown or unclear, leave this section blank. The ADL Registrar will assist in making a determination.

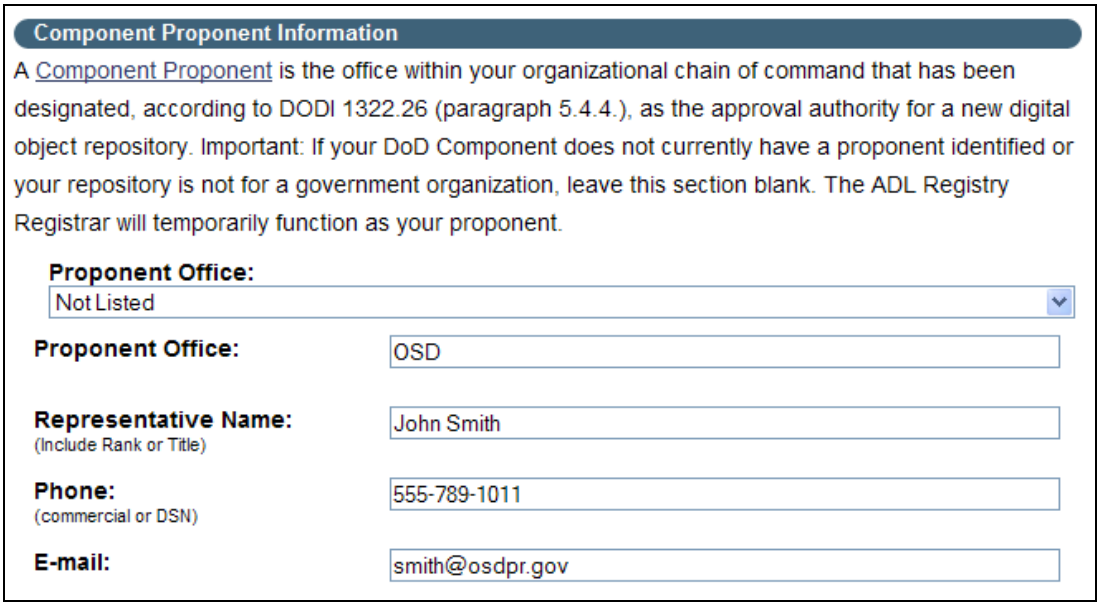

Figure 22 – Component Proponent information

3.2.1.5 Additional information

The additional information section of the form is shown in Figure 23. All information in this section of the form is optional.

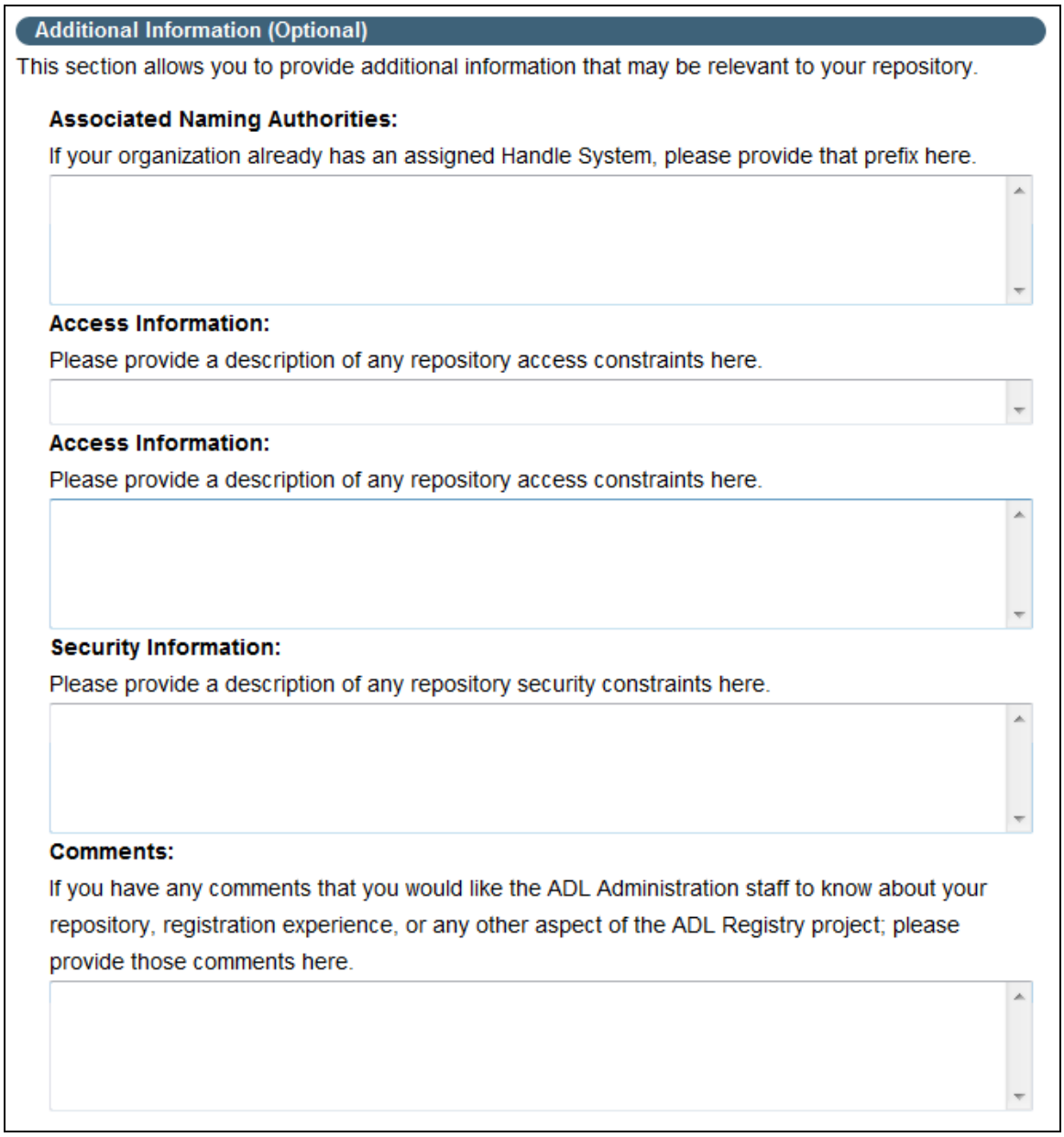

Figure 23 – Additional information

Associated Prefixes: If your repository already has one or more assigned Handle System prefixes, enter them here. If not, ADL will assign prefixes – one to use with the operational registry and the other with the practices registry. (Most repositories will not already have assigned prefixes. See Section 2.6.)

Access Information: This information should describe what access by whom is granted to the repository. For example, it should describe the type of user authentication required and how digital objects or other information may be accessed. If special access limitations exist, they should be noted here.

Security Information: Any specific security limitations to the use or access of the repository or its digital objects should be noted here. (As previously stated, the ADL Registry does not support the registration of classified objects.)

Comments: Any special notes or aspects about the repository that would be of interest to ADL Registrar should be noted here.

3.2.2 Repository registration confirmation

After the registration form has been submitted, you will receive the confirmation shown in Figure 24.

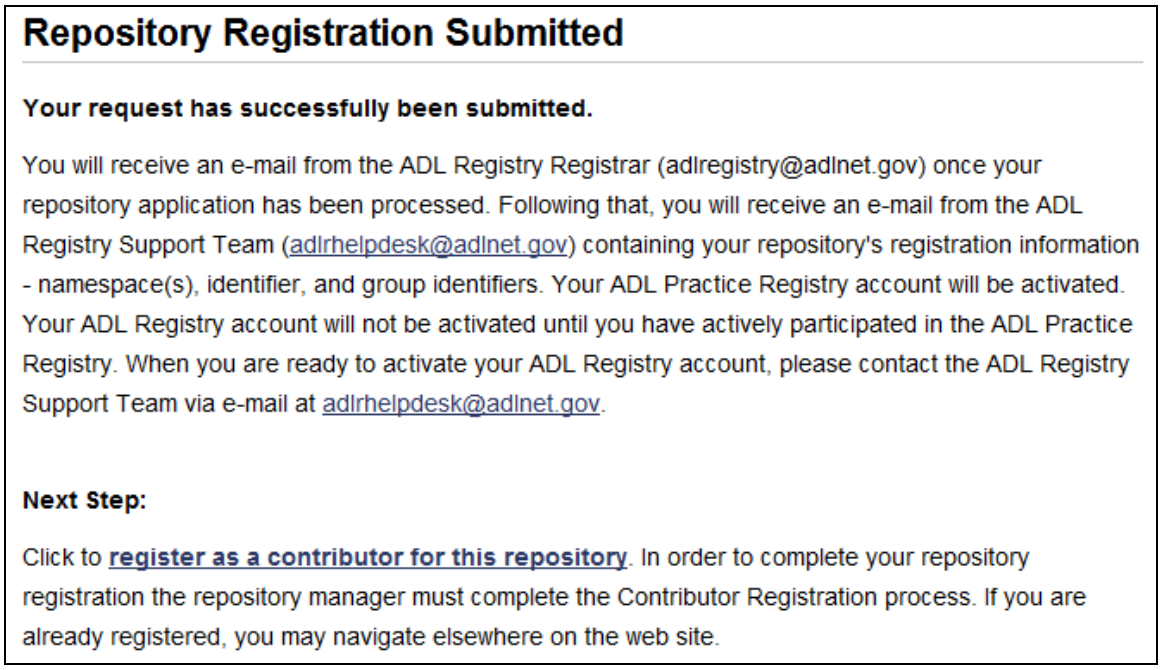

Figure 24 – Repository registration confirmation

The ADL Registrar will review the application and contact the repository's DoD Component Proponent for approval. The registrar will notify the repository sponsor and the ADL Registry Help Desk when the repository is approved. If more information or clarification is needed before approval, the registrar will contact the repository manager.

The help desk will then contact the repository manager to establish accounts for contributors who are to be authorized to contribute metadata records to the ADL Registry. The repository manager is responsible for keeping these accounts current and will be contacted by the help desk when a contributor account request is received. (To register a contributor, see Section 3.3.)

3.2.3 Final steps

Once the registration form has been validated and the ADL Registrar has approved the repository, it will be assigned a unique handle prefix. This prefix is used to form the persistent identifier for all digital objects that are registered in the ADL Registry. (See Section 2.6 for more information on handles and prefixes.)

Repositories owned or managed by DoD organizations or other approved federal activities will be assigned a handle prefix (e.g., 100.50.1.2) for the operational ADL Registry. All these prefixes start with 100.50 and are used to build the handles that identify objects within a repository. Repositories will also be assigned a unique repository identifier (e.g., 100.51/adlrepository). This identifier is used to specify the repository in metadata records (see Section 5.3).

NOTE – Repositories with an operational registry account are also given a practice registry account with a handle prefix of "4444".

3.3 Registering a contributor

At the request of a repository manager, ADL will provide access rights to individuals who may contribute metadata to the ADL Registry on behalf of a repository. Contributors must be registered to submit metadata.

Access to the ADL Registry is granted by creating contributor groups. To obtain access rights, a contributor must be a group member. Rights are not granted directly to individual contributor accounts.

NOTE – This section assumes that you are registering a contributor for the operational registry. After registration, the contributor will have access to both the operational and practice registries. To register a contributor for the practice registry only, select *Practice Registry* from the main menu and then select *Register Contributor* from the drop-down menu. The procedure is the same except that the contributor will have access to the practice registry only.

3.3.1 The contributor registration form

To register a contributor, select *Contribute* from the main menu on the left of any page and then select *Register Contributor* from the drop-down menu. The contributor registration form, shown in Figure 25, captures the contributor's contact information as well as information about the repository and its manager. The form should be completed by or under the direction of the repository manager.

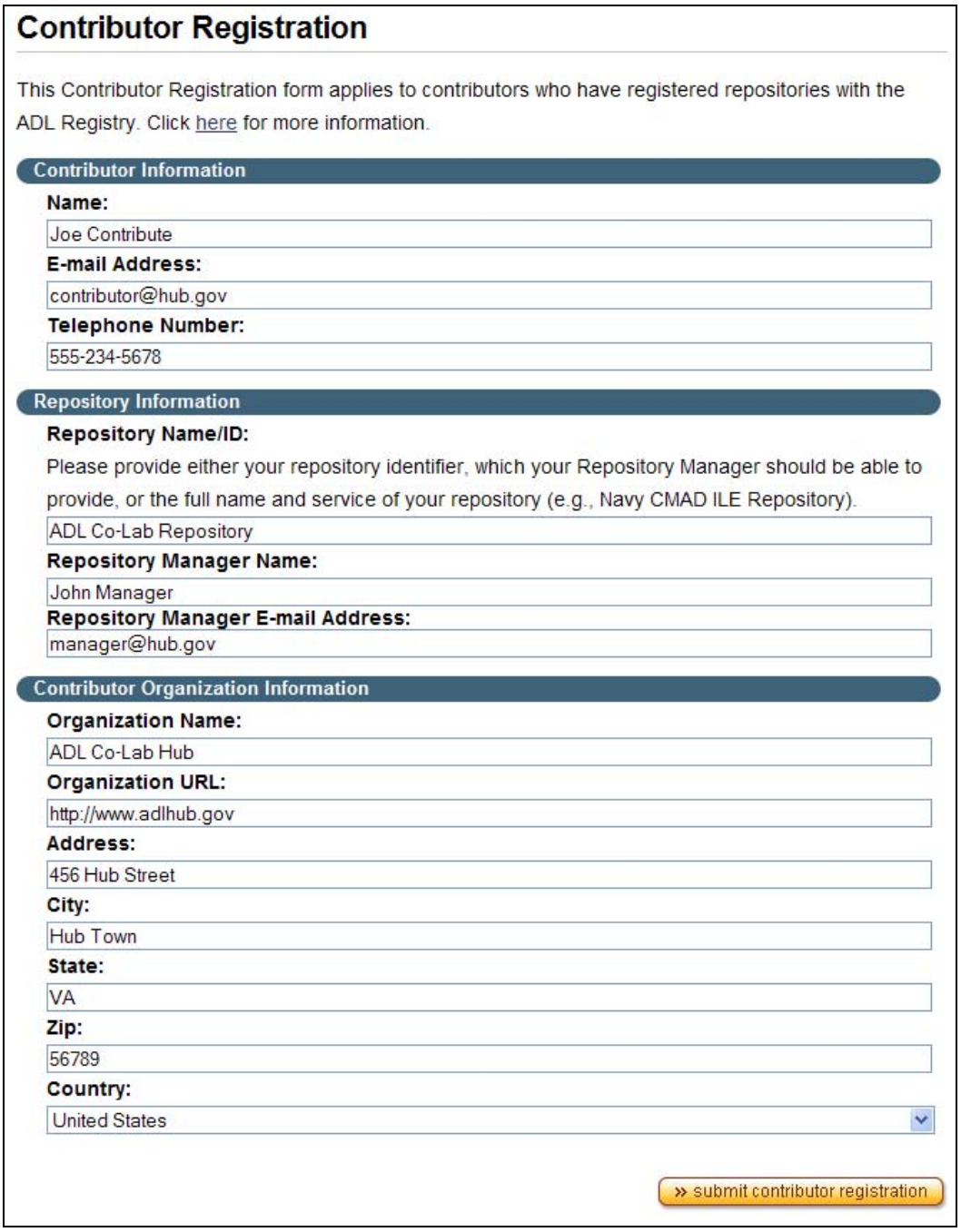

Figure 25 – The contributor registration form

Once the form has been completed, click *» submit contributor registration*. The message in Figure 26 will be displayed, and the form will be sent to ADL for processing. The ADL Registry Help Desk will contact the repository manager and request authorization to provide the contributor appropriate access rights to the ADL Registry.

NOTE – For non-DoD and non-approved federal organizations, contributors will automatically be associated with the practice registry.

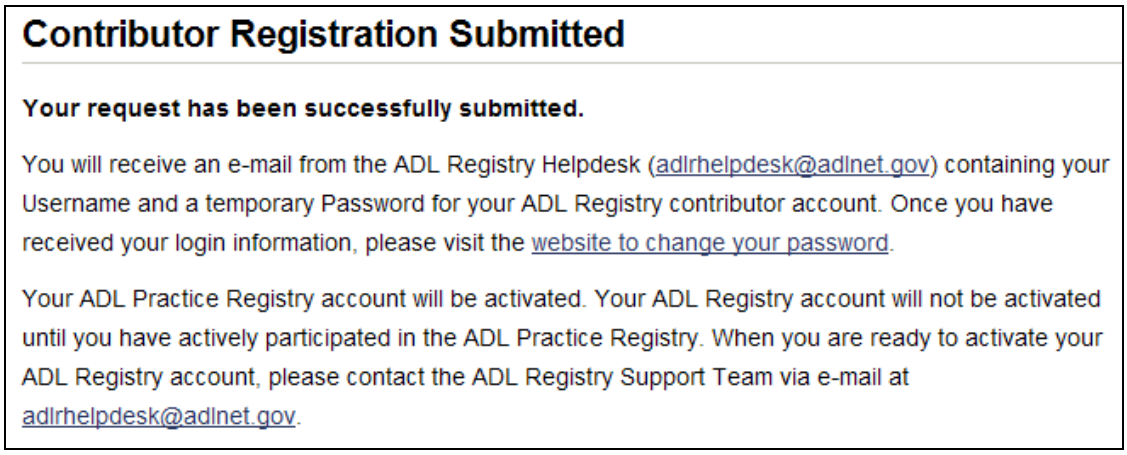

Figure 26 – Contributor registration confirmation

3.3.2 Contributor rights

The types of transactions a contributor can perform when submitting or manipulating metadata records depend on the rights given to the contributor. The ADL Registry Help Desk provides these rights by assigning contributors to contributor groups. (See Section 5 for information about transaction types.)

The help desk creates two groups for a repository. The first group is intended for typical contributors. The second group is intended for managers and advanced contributors. The transaction permissions associated with each of these groups are as follows:

- **Contributor group**: insert, update, activate, search, and deactivate.
- **Manager group**: insert, update, activate, search, deactivate, delete, withdraw, and move.

The repository manager is responsible for determining the groups to which contributors are assigned and for notifying contributors of their group membership and associated rights.

3.4 Contributing metadata

Digital objects are contributed by submitting transactions that contain metadata to the ADL Registry. The metadata is stored in the ADL Registry. The objects themselves reside in the contributing repositories. Additional transactions allow manipulation of the metadata. Each type of transaction (insert, update, activate, deactivate, delete, withdraw, and move) follows the same submission process. (See Section 5 for more information on transaction types.)

The ADL Registry Web site provides two ways to contribute metadata. You can either use an online form to describe your object or upload an XML transaction file that describes the object.

3.4.1 Contributing metadata with the online form

To contribute metadata using the online form, select *Contribute* from the main menu on the left of any page and then select *Contribute with Form* from the drop-down menu to display the log-in form shown in Figure 27.

NOTES:

1. This section assumes you are contributing metadata to the operational registry. To contribute to the practice registry, select *Practice Registry* from the main menu and then select *Contribute with Form* from the drop-down menu. The information required to register an object is the same.

2. To simplify the use of the online form, it has been designed to accept the minimum amount of information needed to register an object. Additional information is supported when metadata is contributed by uploading an XML file. (See Sections 3.4.2 and 4.)

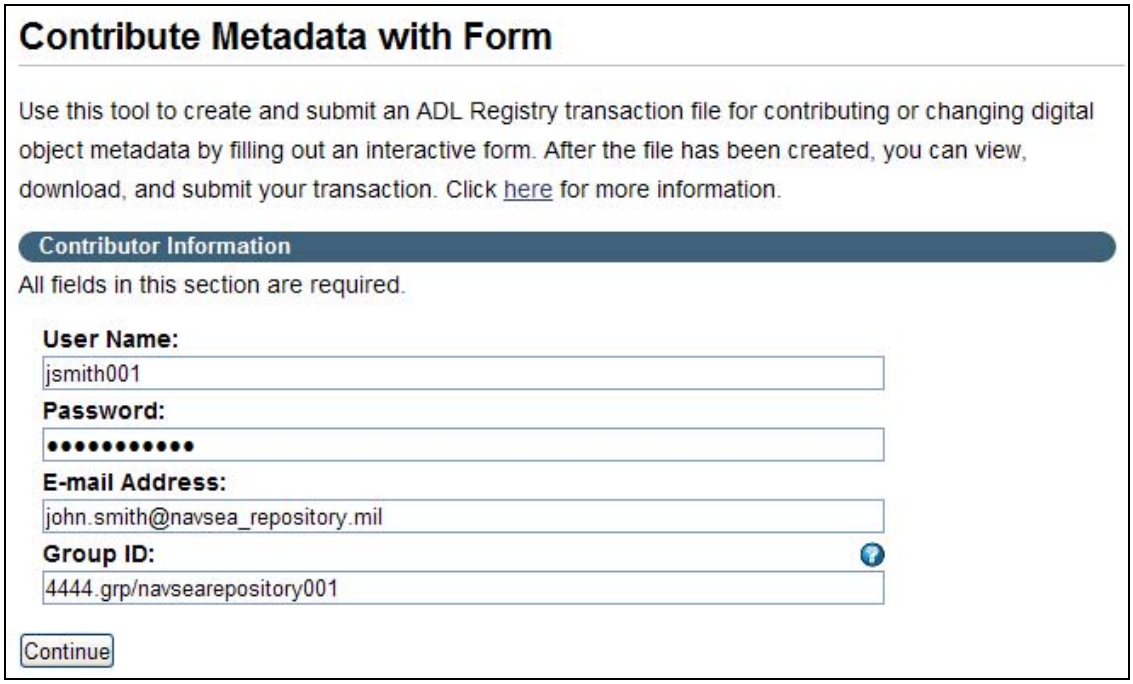

Figure 27 – Logging into the online contribution form

Enter the user name and group ID that were assigned to you when you registered as a contributor, your password, and your e-mail address and then click *Continue*. The menu shown in Figure 28 will be displayed.

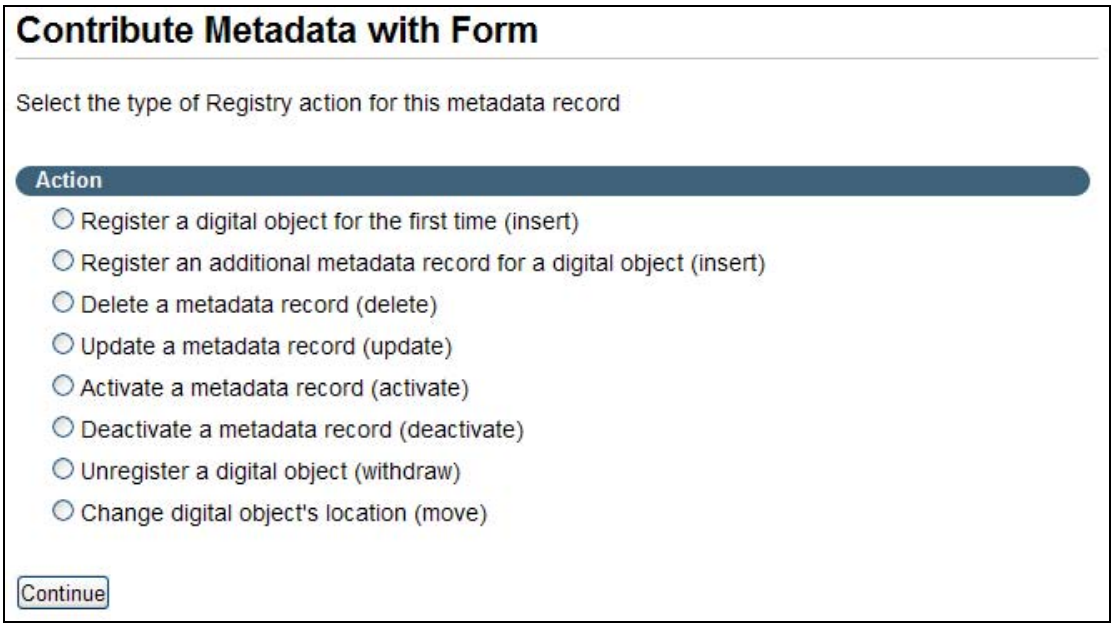

Figure 28 – Selecting a transaction type

Select *Register a digital object for the first time (insert)* and then click *Continue*. A multipart contribution form will be displayed. (See Section 5.2 for an explanation of the other transactions in the menu.)

The rest of this section gives an example of using the form to register a hypothetical sonar course. Note that the ADL Registry Web site fills in some fields of the form with information that is constant for contributing a new object. To see this information, click *additional information* in the various sections of the form.

3.4.1.1 General information

Provide a title, keywords (or phrases) that will be useful to searchers and a brief description as shown in Figure 29. Keywords should be chosen carefully to ensure their usefulness. They will be the primary means used by searchers to find your object.

To add keywords, enter a keyword into the input field and then click *Add*. The item will be transferred to the larger box. To remove a keyword, click on it in the larger box and then click *Remove*.

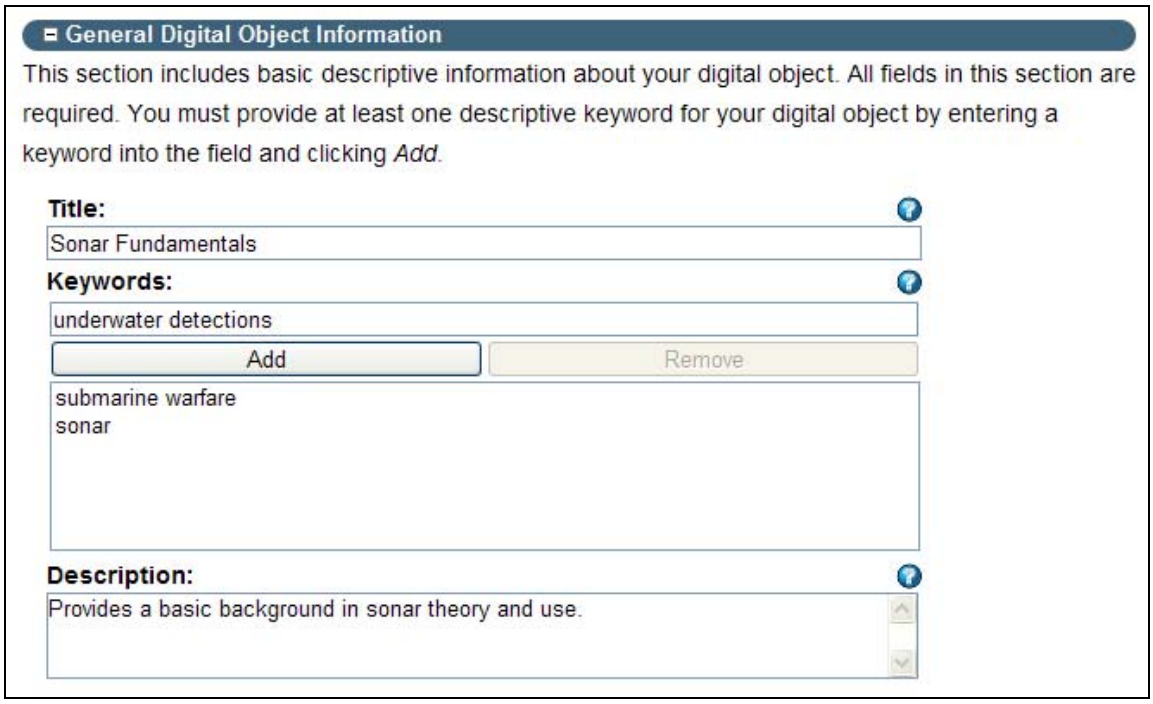

Figure 29 – General information

NOTES:

1. The title field is limited to 1,000 characters.

2. Be sure to click *Add* after entering each keyword. Failure to do so will result in either the keyword being ignored or an error, depending on whether the large box contains any information when the contribution form is submitted for processing.

3.4.1.2 Life-cycle information

As shown in Figure 30, enter the version of your digital object according to whatever versioning scheme your repository uses and then select its status from the drop-down menu. If multiple versions of an object are to be registered, register each as a separate object. The status value indicates either whether the object is a draft, final, or revision, or the current phase of the program for which the object is being registered according to the terminology used in DoDI 1322.20 [1].

NOTE – The version field is limited to 50 characters.

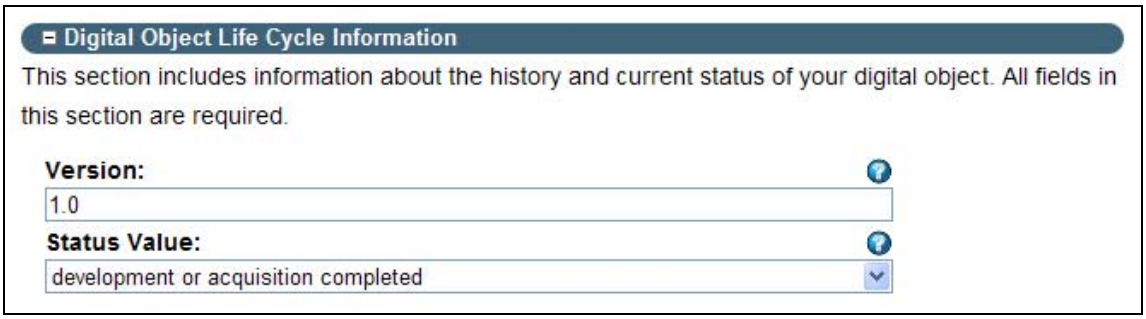

Figure 30 – Life-cycle information

3.4.1.3 Contributor information

As shown in Figure 31, enter the name of the digital object's author.

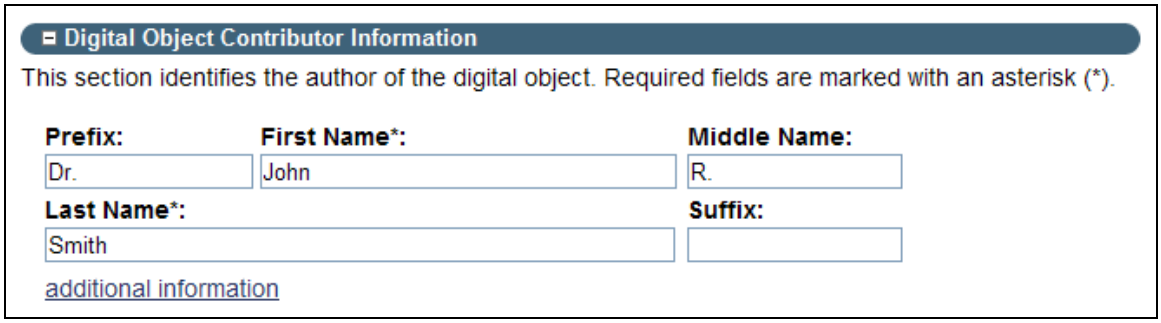

Figure 31 – Contributor information

NOTE – Each of the contributor information fields is limited to 148 characters.

3.4.1.4 Metadata schema information

To view this section of the form, click + to the immediate left of the section title shown in Figure 32 to display the information shown in Figure 33. This section of the form specifies the metadata schemas used to develop the metadata for your digital object. The values "LOMv1.0" and "ADL-Rv1.0" are required and cannot be changed. Although you cannot specify additional schemas with the contribution form, you can do so when registering an object by uploading an XML file (see Section 3.4.2).

Figure 32 – Metadata schema information (collapsed)

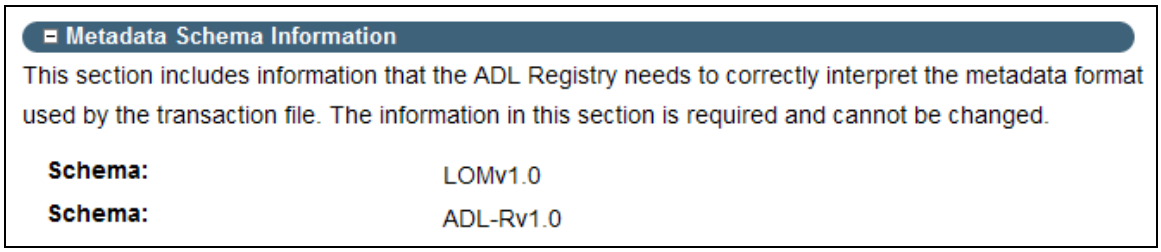

Figure 33 – Metadata schema information (expanded)

3.4.1.5 Technical information

As shown in Figure 34, specify all file formats used by your digital object. Formats are specified as Multipurpose Internet Mail Extension (MIME) types [5], which are reflected in file name extensions. If your object includes files that do not have MIME types, use "other" for these files. A reference for MIME types is available at

http://www.w3schools.com/media/media_mimeref.asp.

The additional value "non-digital" is allowed for objects that are not available for downloading, such as a course that is available only on a CD.

To add a format, enter it into the input field and then click *Add*. The item will be transferred to the larger box. To remove a format, click on it the larger box and then click *Remove*.

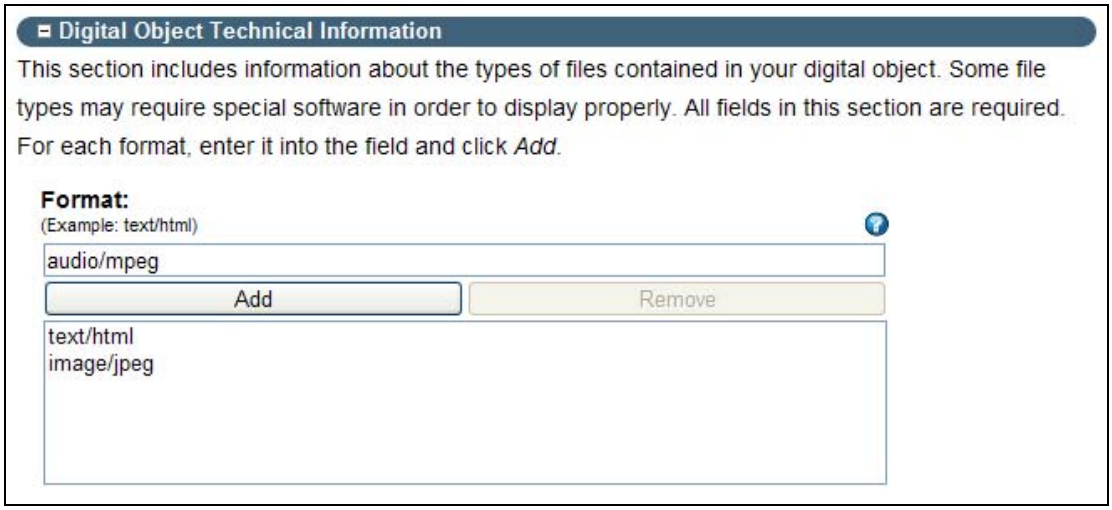

Figure 34 – Technical information

NOTE – Be sure to click *Add* after entering each format. Failure to do so will result in either the format being ignored or an error, depending on whether the large box contains any information when the contribution form is submitted.

3.4.1.6 Copyright information

As shown in Figure 35, specify whether your digital object is copyrighted. Choosing "yes" does not preclude others from sharing your object. It simply informs them that restrictions exist.

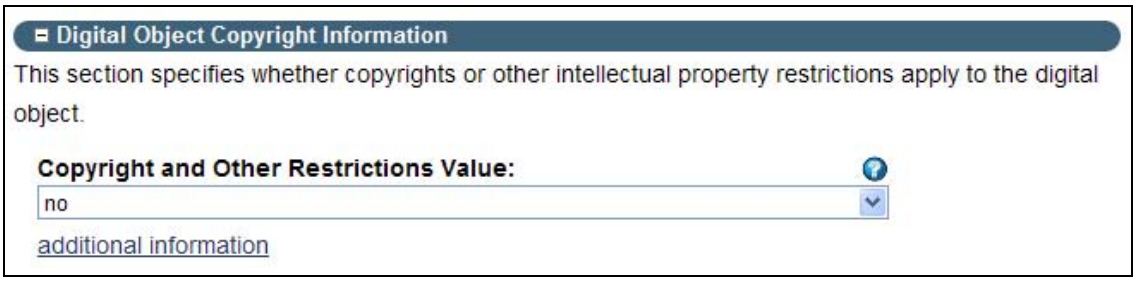

Figure 35 – Copyright information

3.4.1.7 Security classification information

To view this section of the form, click + to the immediate left of the section title shown in Figure 36 to display the information shown in Figure 37. The fields in this section of the form cannot be changed. Currently, the ADL Registry supports registering unclassified digital objects, only.

Figure 36 – Security classification information (collapsed)

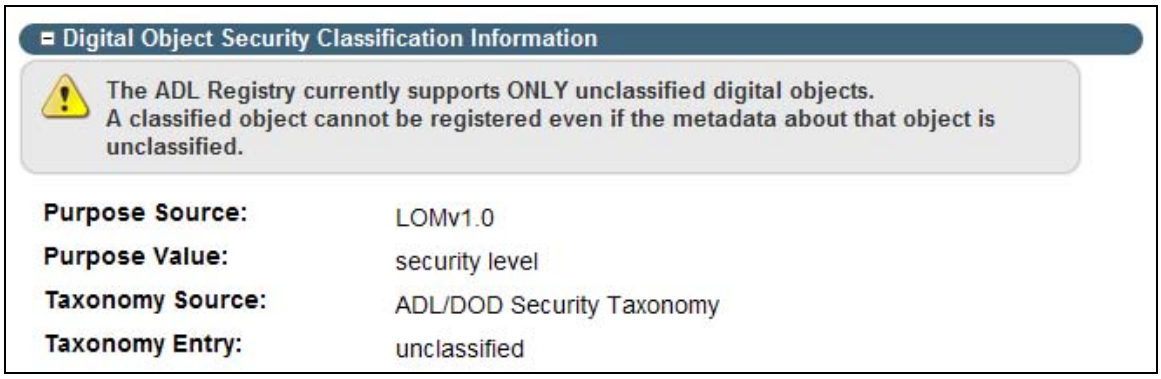

Figure 37 – Security classification information (expanded)

3.4.1.8 Type information

As shown in Figure 38, specify whether your digital object is an individual asset (e.g., an image, a competency, or a technical document), a single SCORM SCO, or an aggregation of two or more objects (e.g., a collection of assets or a SCORM package containing two or more SCOs). Select *other* if none of the specific menu choices are appropriate.

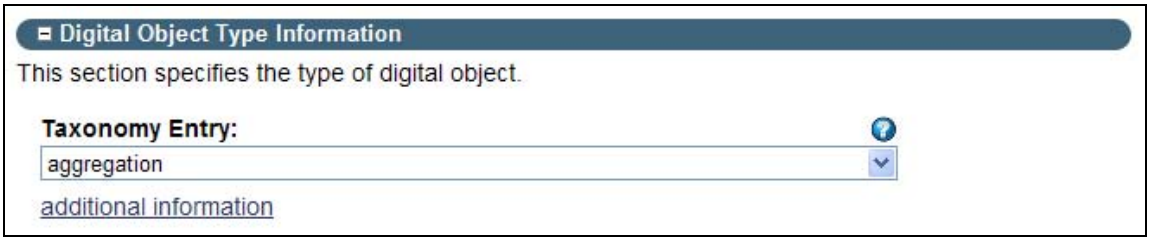

Figure 38 – Type information

NOTE – If you feel that a new object type should be added to the menu of types, please contact the ADL Registry Help Desk.

3.4.1.9 Distribution restriction information

As shown in Figure 39, specify any restrictions on the distribution of your digital object. For objects related to learning, such as courses, modules, and media assets that might be used in courses, select one of the descriptive statements in the first half of the menu. For documents, such as S1000D™ [6] technical manuals, select one of the distribution statements. If you are not sure which menu choice applies to your object, ask your repository manager or security officer. Descriptive choices are based on DoDI 1322.20 [1]. Distribution statements are based on Department of Defense Directive (DoDD) 5230.24 [3].

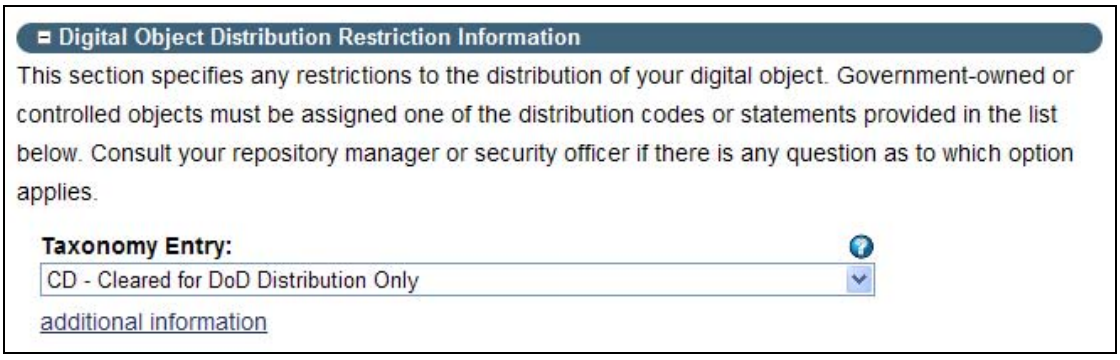

Figure 39 – Distribution restriction information

3.4.1.10 Compliance information

This section of the form describes the primary specification or standard that applies to your digital object. As shown in Figure 40, select a specification from the menu or select *other* if your object complies with a specification that is not listed. If compliance does not apply to your object, select *none*.

NOTE – Although the registration form supports the specification of only one compliance value, you can provide multiple values when registering a digital object by uploading and XML file (see Section 3.4.2)

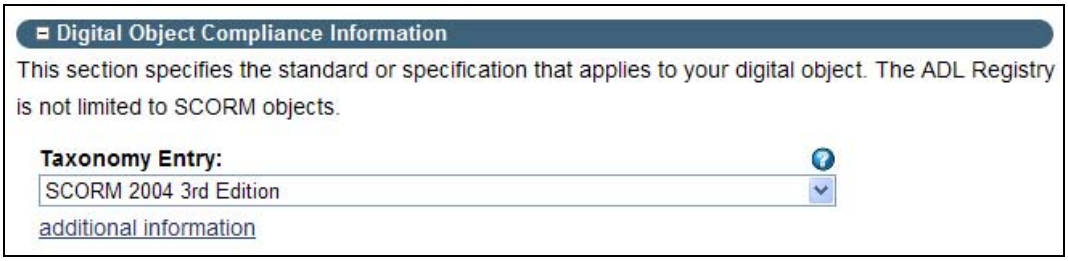

Figure 40 – Compliance information

3.4.1.11 Collection information

As shown in Figure 41, specify the groups that may find your digital object to be useful. At minimum, specify “DOD”. You may specify additional applicable categories, such as DAC or NAVAIR, by entering them after “DOD” in the provided input field.

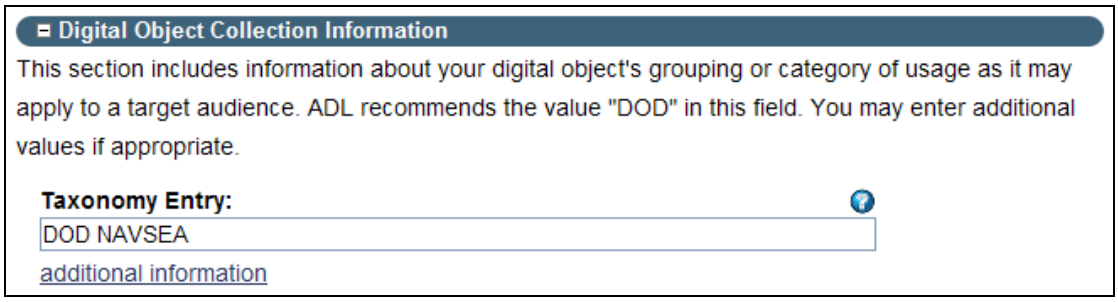

Figure 41 – Collection information

NOTE – The collection field is limited to 500 characters.

3.4.1.12 Educational objective information

This section of the form is optional. To view this section of the form, click + to the immediate left of the section title shown in Figure 42. As shown in Figure 43, you may enter the educational objective's source (Taxonomy Source), its unique identifier (Taxon ID), and its descriptive title or objective summary statement (Taxonomy Entry).

Figure 42 – Educational objective information (collapsed)

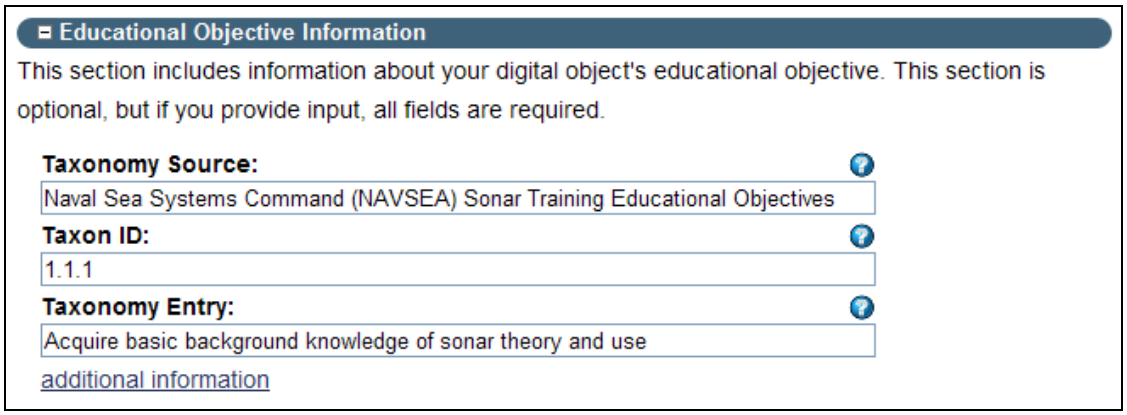

Figure 43 – Educational objective information (expanded)

NOTE – Although this section of the form is optional, if you provide educational objective information, you must provide input for all three fields.

3.4.1.13 Competency information

This section of the form is optional. To view the section, click + to the immediate left of the section title shown in Figure 44. As shown in Figure 45, you may enter the competency's source (Taxonomy Source), its unique identifier (Taxon ID), and its descriptive title or summary statement (Taxonomy Entry).

Figure 44 – Competency information (collapsed)

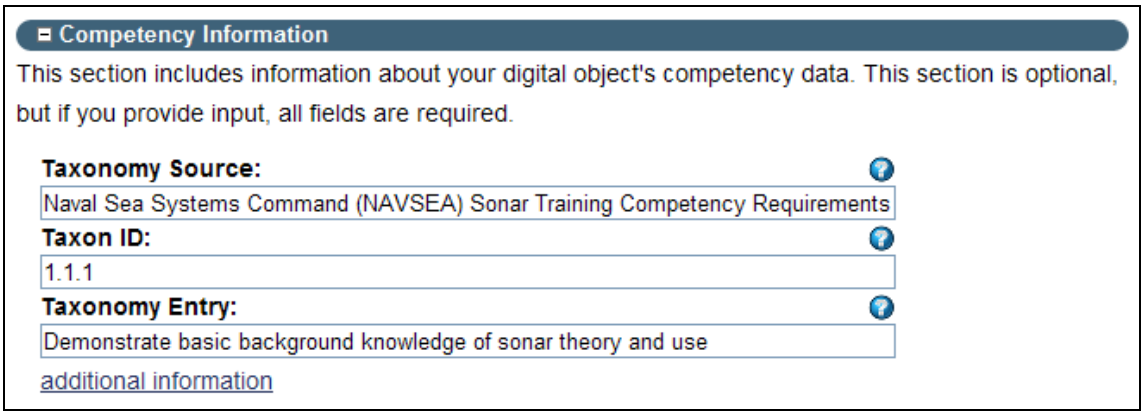

Figure 45 – Competency information (expanded)

NOTE – Although this section of the form is optional, if you provide competency information, you must provide input for all three fields.

3.4.1.14 Transaction information

As shown in Figure 46, enter a unique ID for your digital object and enter your repository's ID.

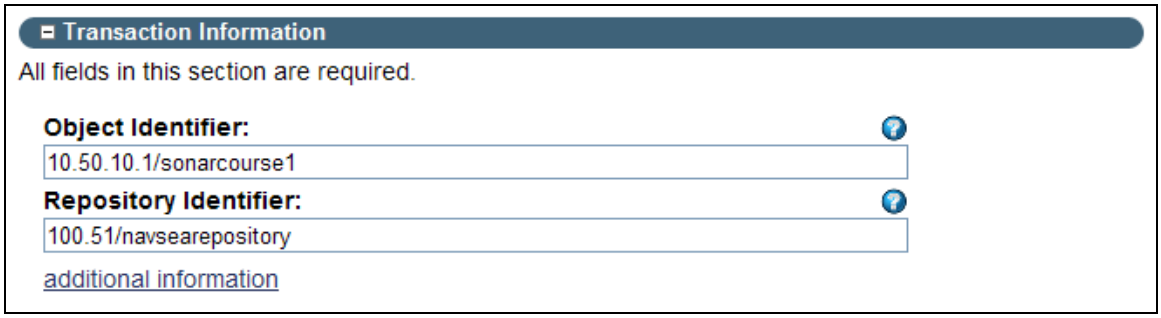

Figure 46 – Transaction information

NOTE – The identifier fields are limited to 255 characters each.

3.4.1.15 Object location information

As shown in Figure 47, enter one or more locations (URLs) for your digital object. (See Section 3.1.2.1 for an explanation of the various locations.)

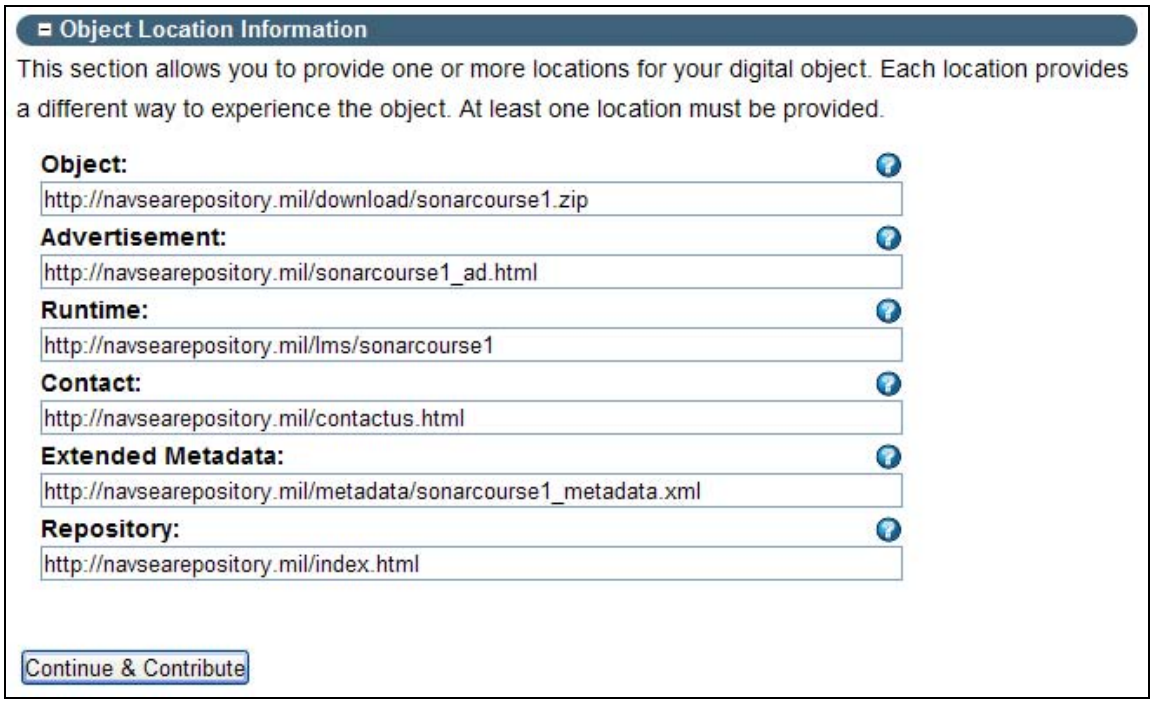

Figure 47 – Object location information

3.4.1.16 Submitting your contribution

To submit your contribution, click *Continue & Contribute* at the bottom of the contribution form (see Figure 47). Assuming you have filled out the form correctly, a transaction file will be created and the acknowledgement shown in Figure 48 will be displayed. If the contribution form contains an error, you will be returned to the form.

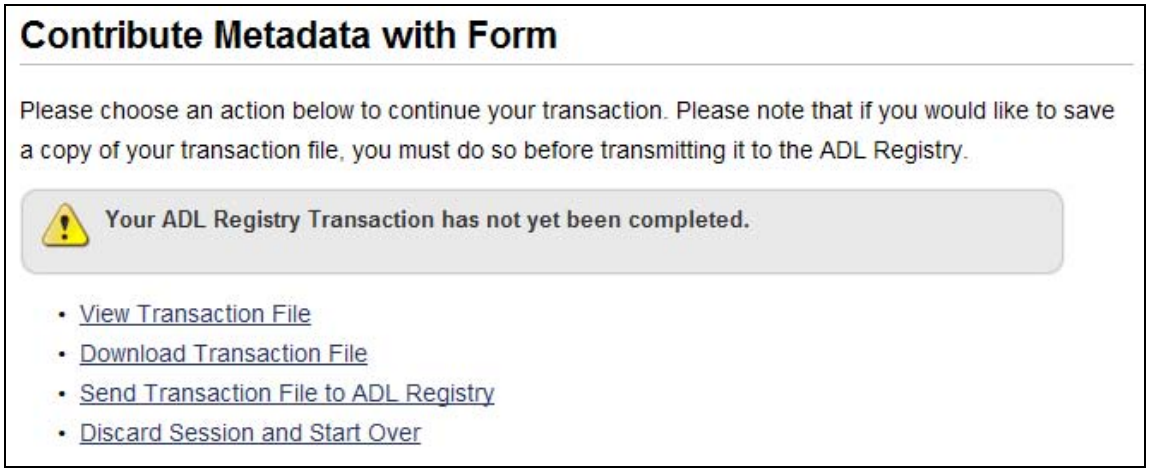

Figure 48 – Final steps

You can view or download the XML transaction file for your submission or delete your submission and start over by clicking the appropriate menu choice. To submit the

transaction and register your digital object, click *Send Transaction File to ADL Registry*. If you leave this page without sending your transaction file to the ADL Registry, your object contribution will be discarded. (To determine the results of your submission, see Section 3.4.3.)

3.4.2 Contributing metadata by uploading an XML file

Instead of using the online form, you can contribute metadata by uploading an XML transaction file that contains the metadata that describes your digital object and the transaction to be performed. Sections 4 and 5 provide more information on digital object and transaction metadata, respectively. Volume 3 gives detailed information on these topics.

To contribute metadata buy uploading an XML file, select *Contribute* in the main menu on the left side of any page and then select *Contribute with XML File* from the drop-down menu to display the form shown in Figure 49.

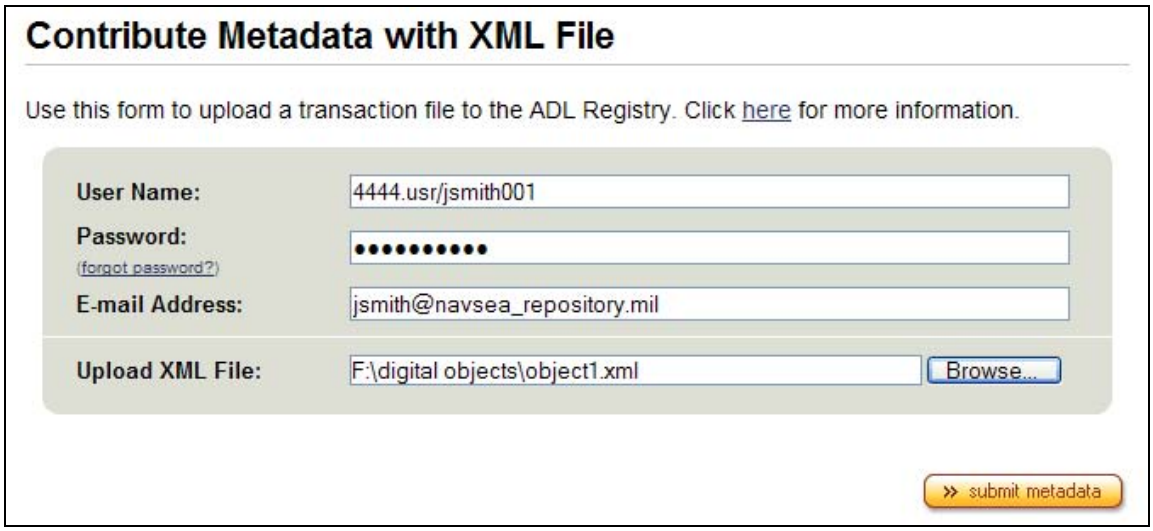

Figure 49 – Contributing metadata with an XML file

Enter the user name that was assigned to you when you registered as a contributor, your password, and your e-mail address. In the Upload XML File field, either enter the complete path including the file name of the XML file you want to submit or click *Browse…* to navigate to the file. Once the form has been completed, click *» submit metadata*. (To determine the results of your submission, see Section 3.4.3.)

NOTE – Although an e-mail address is not required, you should provide one if your XML file is greater than 10 MB in size because the ADL Registry may not process your submission immediately. Doing so allows the ADL Registry to notify you of your submission's status by e-mail. The notification e-mail contains an XML description of the contribution and is intended primarily for developers who submit large XML files. If the ADL Registry does not process your transaction immediately, you will be notified by e-mail that processing is pending and again when the transaction has been processed. (See Section 3.4.3 for more information on events after transaction submission.)

3.4.3 Contribution results

If you submitted your metadata by uploading an XML file and your metadata contained no errors that prevented its processing, you will receive a message similar to the one shown in Figure 50. If, instead, you receive an error message, note the error code. You can either contact the ADL Registry Help Desk via the provided link or see Section 6 to learn more about common errors.

If you submitted your metadata using the contribution form, a message similar to the one in Figure 50 will always be displayed. Using the form ensures that the metadata is properly formatted for processing.

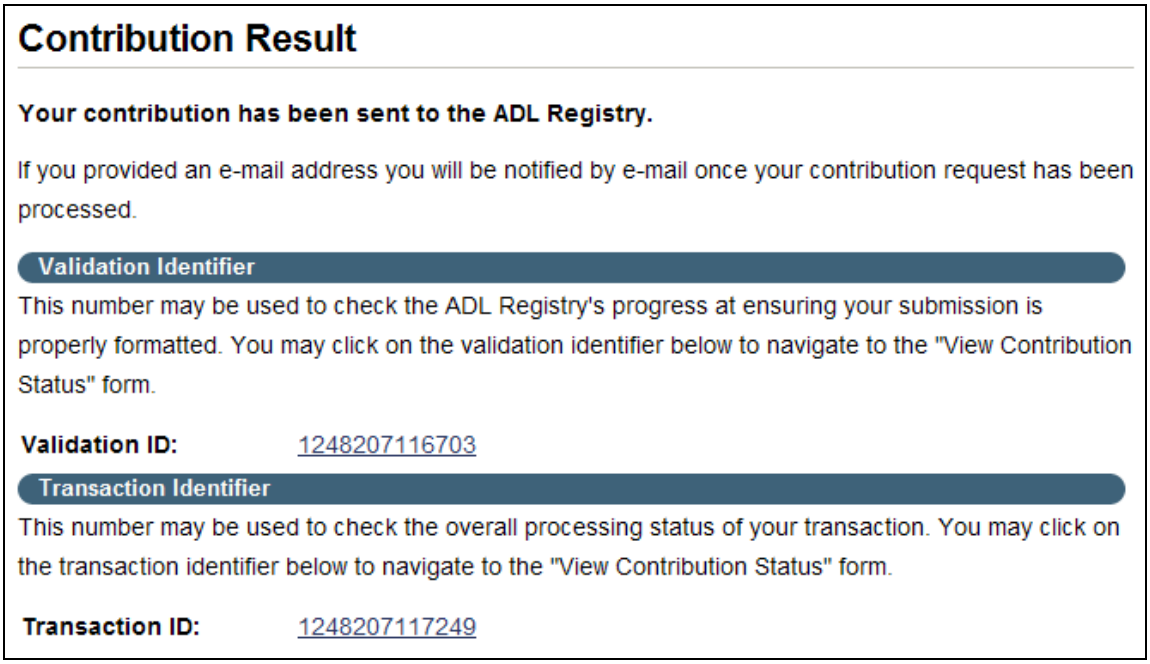

Figure 50 – A contribution result message

A message similar to the one in Figure 50 indicates that your submission was accepted for processing. It does not confirm that your object was successfully registered. To determine whether your object was registered, click the transaction ID number. A screen similar to the one in Figure 51 will appear. In addition, you may want to make note of the transaction ID for future reference (The screen in Figure 51 can also be accessed by selecting *Contribute* from the main menu on the left side of any page and then selecting *View Contribution Status* from the drop-down menu.)

NOTE – If you uploaded a large XML file (greater than 10 MB), the ADL Registry may not process your contribution immediately. In this case, a message similar to the one in Figure 50 will be displayed, but the message will provide a validation ID only. You can click this ID to determine if your contribution file was accepted for processing. Later, you can check on the success of the contribution using the transaction ID that was provided by e-mail.

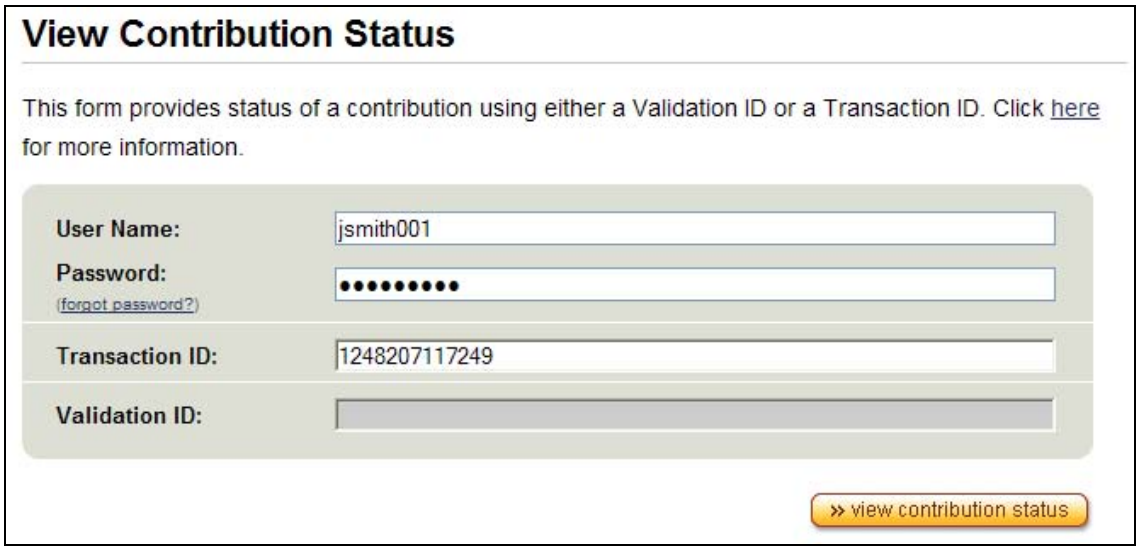

Figure 51 – The view contribution status form

Because you accessed this form directly from the Contribution Results page, the Transaction ID field was automatically completed for you. Enter your user name and password and click *» view contribution status*. If your submission was successful, you will receive a message similar to the one shown in Figure 52. If, instead, you receive a message stating that your submission failed, you can contact the help desk to resolve problems with the submission.

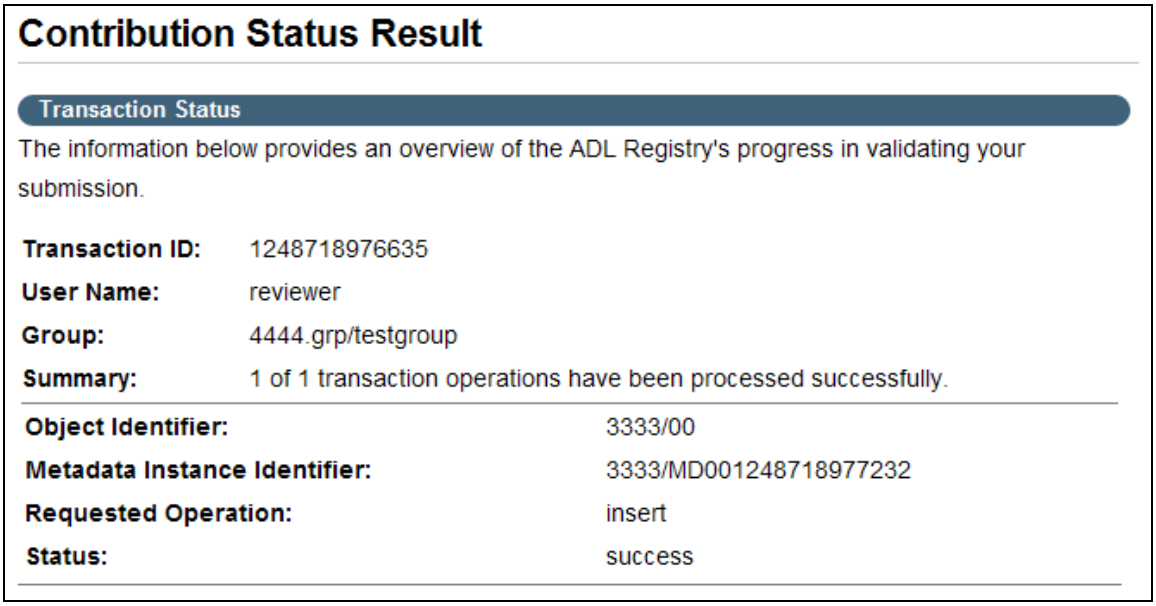

Figure 52 – A successful contribution

3.5 Getting help

The ADL Registry Web site provides several features to help registry users. To access these features, select *Help* in the main menu on the left side of any page.

3.5.1 Additional information

The first two items in the Help drop-down menu, *About ADL* and *About the ADL Registry*, link to the main ADL Web site home page and the ADL Registry page that resides on the main site, respectively. These pages provide general information about the ADL project and the ADL Registry.

Selecting *ADL Registry FAQ* accesses "Frequently Asked Questions About the ADL Registry," shown in part in Figure 53. This FAQ provides information about multiple topics of interest to many registry users. Click on one of the topics in the list to get more information about the topic.

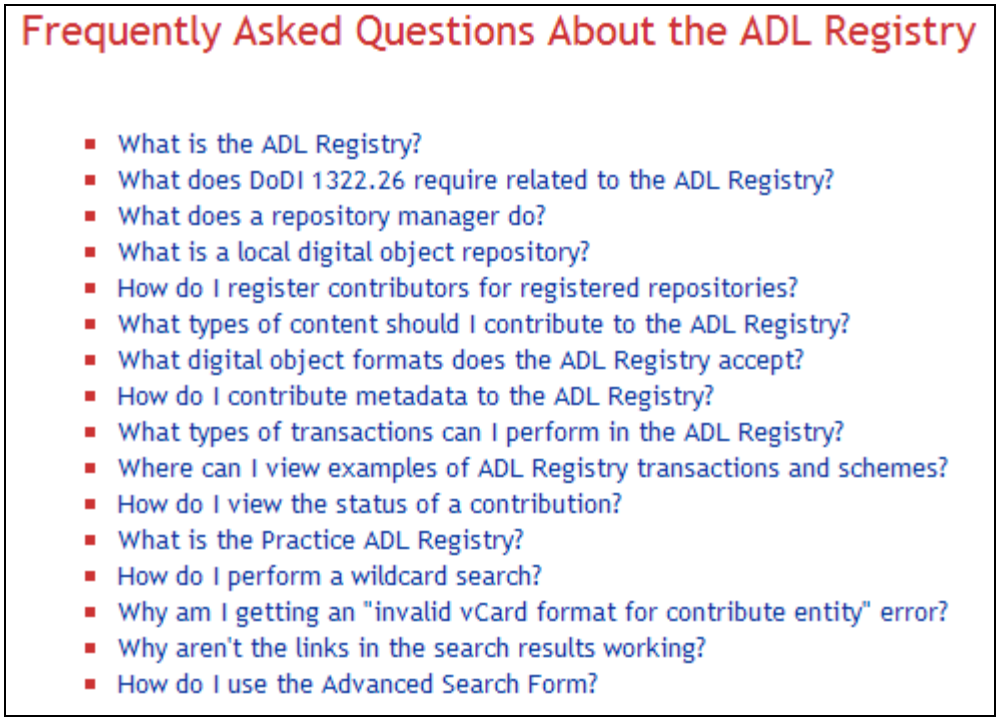

Figure 53 – FAQ topics

3.5.2 Contacting the help desk

If you have questions or comments about the ADL Registry, select *Contact Us* from the Help drop-down menu. Enter your contact information and your question or comment as shown in Figure 54 and click » *submit*. You will receive an e-mail confirming reception of your question or comment, which will be followed by a response from the help desk. Instead of using the form, you can call or e-mail the help desk using the displayed contact information.

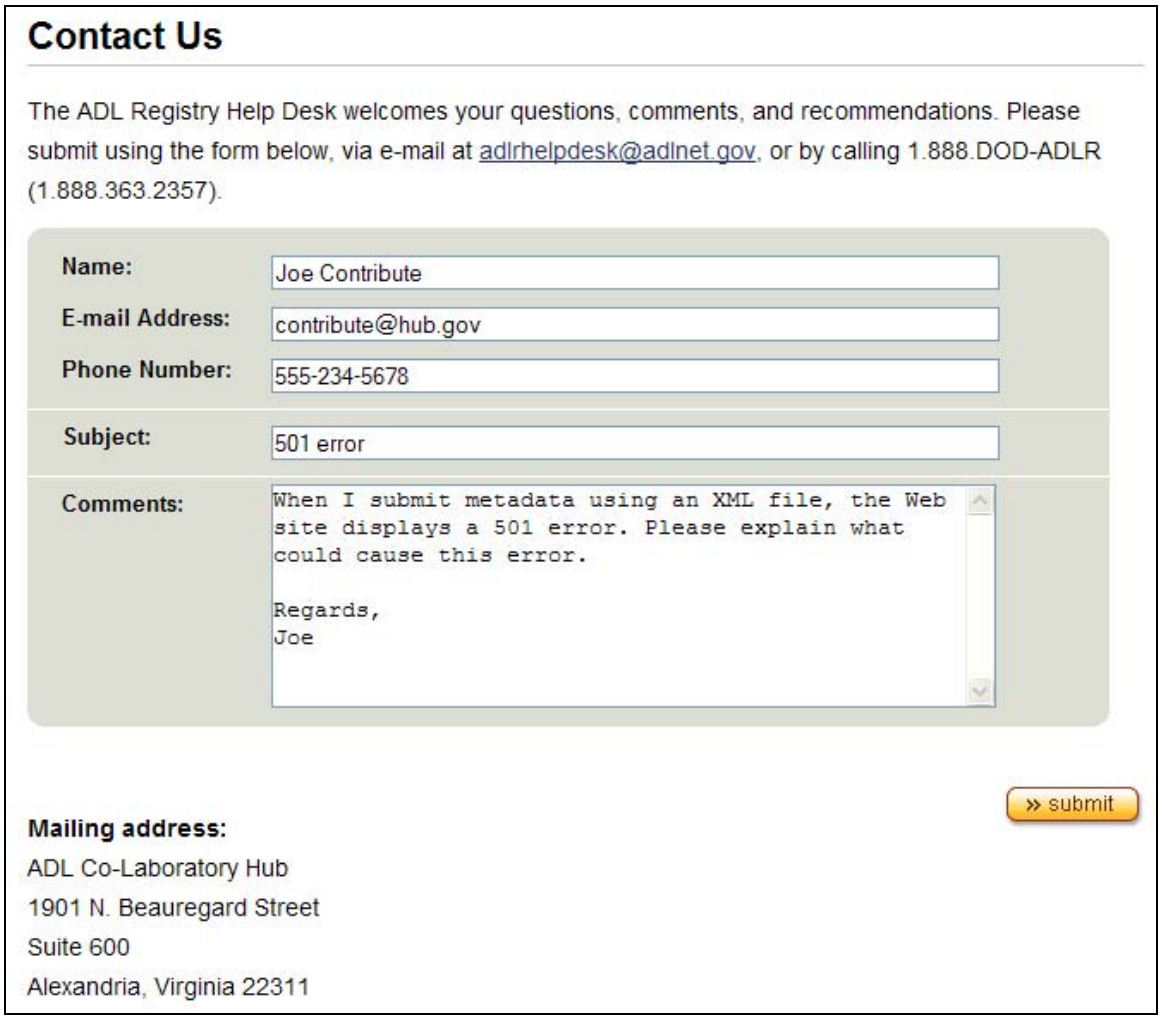

Figure 54 – The contact us form

3.5.3 Help with user names and passwords

If you have forgotten your user name or password, select *Retrieve Password* from the Help drop-down menu. Enter your name and e-mail address as shown in Figure 55 and click *» retrieve password.* The help desk will send you an e-mail with your user name and a new, temporary password. You should change the temporary password to a new permanent password (see Section 3.5.4).

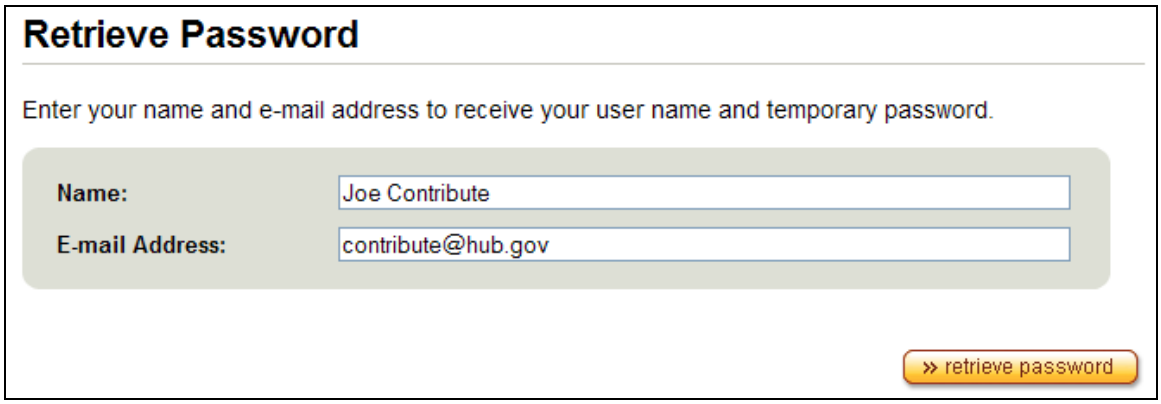

Figure 55 – Retrieving a password

3.5.4 Changing a password

To change your password, select *Change Password* from the Help drop-down menu. As shown in Figure 56, enter your user name, current password, and the new password and click *» change password*. The new password must conform to the requirements listed at the bottom of the form, or it will not be accepted.

Figure 56 – Changing a password

4 Descriptive metadata

ADL Registry metadata is divided into two categories. Descriptive metadata describes digital objects. Transaction metadata describes the transactions that are used to contribute objects and manipulate their descriptive metadata records. This section provides basic information and guidelines for creating descriptive metadata. Section 5 covers transaction metadata. Volume 3 provides more detailed technical information for both categories.

4.1 Creating descriptive metadata for objects

Descriptive metadata provides important information about a digital object, such as title, author, description, and keywords. It enables searchers to locate relevant objects efficiently and effectively. Registering accurate, complete metadata is important.

The mandatory metadata required by the ADL Registry to contribute a digital object is a subset of the metadata in the IEEE LOM standard [4] and has been adapted for use by the ADL community. Additional LOM elements may be used to more fully describe objects. The ADL Registry indexes all metadata so that others can find, share, reuse, and repurpose the objects. (See Appendix B of Volume 3 for a full listing of LOM elements.)

Metadata also can be used to manage objects more effectively in a repository. ADL Registry metadata includes life-cycle management elements, such as security level and access rights, that are useful to those who create and maintain objects.

NOTE – In some cases, existing descriptive metadata may be available for a digital object, such as metadata within a SCORM package or metadata fields that describe a photograph. To make it useful to the ADL Registry, the contributor will need to identify and map the existing metadata to the ADL Registry mandatory and optional metadata elements.

4.1.1 Writing good metadata

To be useful, descriptive metadata must be thoughtful, well written, and specific. Try to anticipate the background, search habits, and common vocabularies of the community likely to be seeking your digital object. Use the most specific and descriptive terms possible. Metadata records are the basis for ADL Registry searches, so try to anticipate how others might pose their search queries.

Keep in mind that different groups may describe the same objects in different ways. For example, the Department of Defense Identification Code (DODIC) applied to ammunition is a 4-digit, alphanumeric code. It is called a DODIC by the Army, NALC (Navy Ammunition Logistics Code) by the Navy, and LARC (Locally Assigned Reporting Code) by the Air Force. To help individuals from each of those branches find objects concerning ammunition, the organization that creates the objects should include the relevant terms used by each of the Services in both the keyword and description metadata elements. Be careful when using local acronyms and terms.

Object developers may generate most of the metadata about their objects, or one individual or group may write all of the metadata for the organization. Often, metadata is best created by those who develop objects because they are most familiar with them. However, local policy determines how metadata is developed and managed.

4.1.2 Versioning in metadata

A metadata record references a single digital object. If, for whatever reason, you wish to register multiple versions of an object, each must be registered as a separate object and have its own unique metadata record in the ADL Registry. If you wish to have only a more recent version of a previously registered object represented in the ADL Registry, you can update the version information in the registered object's existing metadata record.

4.1.3 Metadata element vocabularies

Metadata elements are the individual items, such as title and description, that make up the descriptive metadata. Some metadata elements, such as description, may contain any text that is appropriate – in this case, a free-form narrative describing the digital object. Other elements have defined lists of values, called vocabularies. A vocabulary may be closed or open. If an element has a closed vocabulary, you must use one of the choices provided. If an element has an open vocabulary, you may select a value from the list or provide your own if none of the values are appropriate.

For example, the copyright element has a closed vocabulary that is limited to two valid values: "yes" and "no". Any other value will cause the transaction to fail and report an error. In contrast, the collection element has an open vocabulary that includes the value "DOD". Because the vocabulary is open, a value may either be selected from the predefined list, defined by the contributor, or both.

4.2 Mandatory descriptive metadata elements

Table 1 lists the descriptive metadata elements that are required by the ADL Registry. All mandatory elements must be present with valid values; otherwise, the transaction will fail, and an error will be reported. These elements are mandatory because they have been determined to be the minimal set required to adequately describe digital objects for search purposes or they include information that may be important to those who may wish to reuse the object.

The elements in Table 1 are divided into four categories – general, life cycle, classification, and other – based on the information they provide. The table includes an example based on a HAZMAT course.

NOTE – Even if you are updating an existing metadata record, you must supply all mandatory elements. The existing record is completely overwritten by the updated record.

Table 1 – Mandatory descriptive metadata elements

Element name	Description	Use	Example
GENERAL:			
Title (Use once only)	A descriptive title for the object.	If the object has an official title, such as a title that is or will be listed in a course catalog, use the official title.	HAZMAT Familiarization & Safety in Transportation (AMMO-67)
Description (Use once only)	A succinct description of the object using primarily searchable words and phrases.	Write a few sentences that provide a general overview of the material covered in the object. If the object is a SCO, the description provided within the object will usually suffice as the value for this element.	This course introduces the regulation of hazardous materials during transportation, including publications that affect their movement. It covers visual identification of HAZMAT on packages, transport vehicles, and transportation paperwork. Material Safety Data Sheets (MSDS) are explained. Use of the Emergency Response Guide (ERG) is also covered.
Keyword (Use one or more)	Words or short phrases used to identify or define the object.	List words or phrases that describe the object in terms familiar to the target audience. At least three keywords are recommended and more are allowed.	HAZMAT identification transporting HAZMAT MSDS ERG NOTE – You may enter multiple keywords using a single keyword element.
LIFE CYCLE:			
Version (Use once only)	The current edition or iteration of the object.	Specify the current version. If your organization does not have a defined versioning system, you should create one.	3.0

Element name	Description	Use	Example
Status (Use once only)	The current phase of the program for which the object is being registered or the status of the object.	Choose one of the following from DoDI 1322.20: query only proposed development under development development or acquisition completed program revision out of service program terminated other Or one of the following from IEEE LOM: draft final revised unavailable	under development
Contributor Role (Use one or more in conjunction with Contributor Entity)	The roles of the individuals or organizations that contributed to the object. Contributors are named by the Contributor Entity element.	You must choose "author" at least once; then you may choose any of: author publisher initiator terminator validator editor graphical designer technical implementer content provider object provider technical validator educational validator script writer instructional designer subject matter expert unknown	author validator NOTES: 1. Your metadata may contain multiple roles, and each role may contain individuals and organizations. An author is required, and you may list additional contributors. Vendors working for DoD may want to provide both their corporate information and the DoD Proponent's information. If multiple roles are listed, this element is repeated for each role. 2. The role "content provider" is provided for compatibility with previous versions of the ADL Registry. The role "object provider" should be preferred.

Element name	Description	Use	Example
Contributor Entity (Use one or more in conjunction with Contributor Role)	Names and contact information for individuals and organizations that contributed to the object. The roles of contributors are defined by the Contributor Role element.	List each element of the contact information on a separate line. List at least one contributor entity for each contributor role that you listed.	Defense Ammunition Center (DAC) Directorate for Training 1 C Tree Road McAlester, OK 74501 (918) 420-8961 sjmac-ast@dac.army.mil
Contribution Date (Use once only)	The date of the contribution.	Use the format: YYYY-MM-DD.	2005-09-30
CLASSIFICATION:			
Security (Use once only)	The security classification of the object.	You must select: unclassified	unclassified NOTE – At this time the ADL Registry permits the registration of unclassified objects, only.
Object Type (Use once only)	The type of object.	Choose one of: asset SCO aggregation other	aggregation NOTE – Any object may be registered; however, only SCOs are required by DoD policy to be registered. An object may be an asset, such as a technical document, competency, or image, a SCO, or an aggregation of objects, such as multiple SCOs comprising a course. Use the term that best applies to your object.

Element name	Description	Use	Example
Distribution Restrictions (Use once only)	Any restrictions on distribution of the object. For example, some materials cannot be distributed to foreign nationals.	For objects used in learning, use one of the following two-letter codes from DoDI 1322.20: LR – Legal restrictions to public distribution NR – No legal restriction to public distribution CP – Cleared for public exhibition but not distribution CG – Cleared for government distribution only CD – Cleared for DoD distribution only RD – Restrictions to DoD distribution NF – NOFORN (i.e., not available for foreign nationals) OT – Other For technical reports and other publications, use one of the following from DoDD 5230.24: Distribution Statement A Distribution Statement B Distribution Statement C Distribution Statement D Distribution Statement E Distribution Statement F Distribution Statement X	LR NOTE – If you aren't sure which code or statement to use, ask your repository manager or security officer for help. Determining distribution restrictions is the responsibility of the sponsoring office (the originating activity).

Element name	Description	Use	Example
Compliance (Use one or more)	The primary specification or standard that applies to the object. If appropriate, multiple specifications may be provided.	Choose one or more of: SCORM 2004 3rd Edition SCORM 2004 4th Edition SCORM Version 1.2 S1000D V2.0 S1000D V2.1 S1000D V2.2 S1000D V2.3 S1000D V3.0 S1000D V4.0 IEEE 1484.20.1-2007 RCD other none	SCORM 2004 4th Edition
Collection (Use once or more)	The categories or groups that may find the object to be useful.	At minimum, specify: DOD.	DOD NOTE – You may specify additional applicable categories, such as DAC or NAVAIR.
OTHER METADATA:			
Metadata Schema (Use two or more)	The names and versions of the metadata specifications used to create the metadata.	You must list at least: ADL-Rv1.0 LOMv1.0	ADL-Rv1.0 LOMv1.0 NOTE – The metadata for all ADL Registry entries must conform to both the LOM standard and the ADL Registry Metadata Version 1.0 specification in Volume 3. Your metadata may conform to additional metadata schemas, such as the MedBiquitous Healthcare schema. List all relevant metadata schemas.

Element name	Description	Use	Example
Format (Use one or more)	The format types of files contained in the object.	These values map to specific Multipurpose Internet Mail Extensions (MIME) types. List the MIME type for every file used in the object.	video/mpeg text/html image/jpeg image/gif audio/mpeg NOTES: 1. A reference for MIME types can be found at http://www.w3schools.com/media/media_mimeref.asp. 2. The value "non-digital" is allowed for objects that are not available for downloading, such as a course that is available only on CD.
Copyright and Other Restrictions (Use once only)	Identifies whether there are copyright or other restrictions on use of or access to the object.	Choose one of the following: yes no	yes NOTE – Choosing "yes" does not preclude others from sharing your object. It simply informs them that restrictions exist. Generally, a searcher would contact the author to discuss any restrictions.

4.3 Optional metadata elements and extensions

ADL Registry mandatory descriptive metadata is a specific subset of the IEEE LOM standard [4] combined with specific usage requirements, such as ADL-specific vocabularies. However, this mandatory subset should not prevent you from adding more metadata to be used internally by digital object creators and maintainers or to enable more accurate discovery of relevant objects.

Any additional metadata elements must be defined by the IEEE LOM standard (see Appendix B of Volume 3). The ADL Registry does not allow the addition of new elements as extensions to the standard.

The IEEE LOM standard includes many elements that can be used for many different purposes. When non-mandatory LOM elements are used, their use should be documented to ensure consistency across your organization. This practice will promote consistency and quality across multiple developers in a local community of practice.

5 Transactions and transaction metadata

This section gives more detail on the registry transactions that are available to manage metadata records and the transaction metadata that is required.

5.1 The insert transaction in detail – digital object registration

As previously stated, the ADL Registry is not an object repository. Instead, it uses metadata to identify and describe objects in specific repositories within the ADL community. Objects are registered by "inserting" associated metadata records into the ADL Registry. Figure 57 summarizes the steps involved.

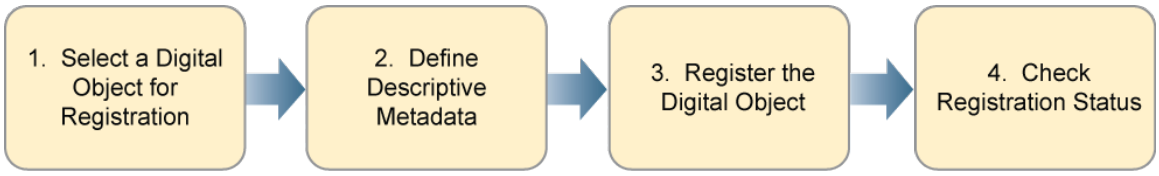

Figure 57 – The registration process

5.1.1 Selecting an object for registration

Object selection is the first step a contributor must take to register metadata for a digital object. Because the ADL Registry stores metadata only, it does not restrict the sizes or types of objects being registered. The only requirement placed on a repository in registering its objects is that it must provide some means to retrieve them. The repository, of course, retains control over local retrieval policies.

For example, a repository manager may manage a set of SCORM 2004 [7] packages stored on a local file server. Network policies could prevent external access to the server. In this case, their location might resolve to a Web page that provides contact information instead of a direct link for downloading packages.

5.1.2 Defining descriptive metadata

After selecting a digital object for registration, the next step descriptive metadata creation. Descriptive metadata is discussed in detail in Section 4.

5.1.3 Registering the object

Once the digital object has been selected and its descriptive metadata has been defined as described in Section 4, the object is registered using an insert transaction. The ADL Registry provides two means for submitting registry transactions:

1. Manually through the ADL Registry Web site, which requires either completing a submission form or uploading an XML file.

2. Automatically using an application that interfaces with the ADL Registry, which requires a custom application that uses the RIM–Lite interface (see Volume 3).

Each registry transaction includes information that informs the ADL Registry about the submission and the contributor. Mandatory information includes

- The identifier of the contributor making the submission.
- The identifier of the group the contributor is acting under.
- A time stamp for the submission.
- The ADL Registry operation being applied (such as insert).
- An object ID and a repository ID (handles). Some transactions also require a metadata instance ID.
- The location from where the digital object can be retrieved.
- The descriptive metadata being submitted.

NOTE – To register an object using an XML file, the descriptive metadata must be formatted as XML [9]. Then, additional information that tells the ADL Registry how to complete the registration is added. This information – or transaction metadata – is also formatted as XML and is called a transaction envelope (see Section 5.3).

5.1.4 Checking registration status

Regardless of the means used to submit a registry transaction, the ADL Registry will process the transaction and feed back the results of that processing. The ADL Registry provides feedback in two parts:

1. **Validation:** The ADL Registry provides immediate results regarding the contributor's authorization and access rights to perform the operation described in the registry transaction and validates the transaction. If the transaction appears complete and valid, the contributor is provided a transaction ID that may be used to check the status of object registration.

2. **Registration:** After a registry transaction has been validated, the ADL Registry indexes and stores the object's metadata. This may happen immediately after validation in the case of the online form or the uploading of a small XML file, or it may involve some delay in the case of a large XML file (typically files of 10 MB or more.)

The contributor can obtain the status of a registry transaction at any time by providing the submission's transaction ID, which is provided by the ADL Registry Web site after a manual submission or by the RIM–Lite interface after an automatic submission. As with submitting a registry transaction, the contributor has two means to obtain transaction status: either manually through the ADL Registry Web site or automatically using RIM–Lite. In both cases, the ADL Registry will respond with the status of the transaction.

If the ADL Registry fails to process a transaction, information contained in the transaction status may be used to help determine the point and cause of the failure. Generally, problems will fall into three categories:

1. **Authentication/authorization error**: The contributor has provided incorrect identification information or is not permitted to perform the operation.
2. **Metadata error**: The object's metadata is invalid, is missing a mandatory element, or one of its elements violates a business rule.
3. **Registry transaction error**: Information in the transaction envelope is either missing or improperly formatted.

See Section 6 for more information on common errors.

5.2 Transaction overview

This section gives an overview of the transactions supported by the ADL Registry. Detailed information on transactions including examples of transaction files is available in Volume 3.

5.2.1 Inserting a metadata record

Transaction name: insert

This transaction inserts a new metadata record that describes a digital object. It is the most common transaction type and is used for contributing new objects as well as adding new metadata records for previously registered objects. The inserted metadata record is assigned a metadata instance ID and can be retrieved through the ADL Registry.

NOTE – If you are adding a new metadata record for an object that has already been registered, *do not* include an object location (URL). This will result in an error (see Section 6).

5.2.2 Updating a metadata record

Transaction name: update

This transaction updates a previously registered metadata record. The transaction replaces the entire existing metadata record with the new record. The XML file must contain a full set of metadata, including elements that will not change with the update. The updated metadata record retains its original metadata instance ID.

5.2.3 Deleting a metadata record

Transaction name: delete

This transaction deletes an existing metadata record. If more than one metadata record exists for a digital object, only the record identified by its metadata instance ID will be deleted. Any search for the object that uses metadata defined in the deleted metadata record will fail.

5.2.4 Deactivating a metadata record

Transaction name: deactivate

This transaction disables searches based on an existing metadata record until further notice. Any search for the digital object that uses metadata defined in the deactivated metadata record will fail. In addition, the record cannot be retrieved using its metadata instance ID. If more than one metadata record exists for an object, only the identified metadata record will be deactivated.

You might want to deactivate a metadata record during updates to its associated object or if the object is no longer in use, but you want to maintain a record of its existence within the ADL Registry.

5.2.5 Activating a metadata record

Transaction name: activate

This transaction enables searches based on a previously deactivated metadata record. Any search for the digital object that uses metadata defined in the reactivated record will succeed. If more than one deactivated record exists for an object, only the identified metadata record will be reactivated.

5.2.6 Moving a digital object's location

Transaction name: move

This transaction informs the ADL Registry that one or more of the locations for a registered digital object have changed. All search results that return the object will reflect the new locations.

5.2.7 Withdrawing all metadata records

Transaction name: withdraw

Unlike delete or deactivate, this transaction removes *all* registered metadata records describing a digital object identified by its digital object ID. All searches for the object will fail because it will no longer be registered.

5.3 Transaction metadata

A transaction envelope contains transaction metadata that identifies the contributor and describes the transaction to be performed by the ADL Registry. Table 2 lists the transaction metadata elements, describes their use, and includes a hypothetical example.

Table 2 – Transaction metadata

Element name	Description	Use	Example
Version	The major version of the ADL Registry with which the envelope complies.	This value must be: adlrt-v1.0	adlrt-v1.0
Submitter Identifier	Specifically identifies a contributor.	Enter the user name that you received after you registered as a contributor to the ADL Registry.	jsmith001 NOTE – The ADL Registry uses the Submitter Identifier to authorize the contributor.
Group Identifier	The contributor group in which the contributor is enrolled.	Enter the contributor group ID that was provided by your repository manager.	4444.grp/navsearepository001 NOTE – Contributors are members of larger groups of registrants. Transaction rights are assigned to groups and determined by group membership (see Section 3.3).
Transaction Action	The action the ADL Registry should take.	Choose one of the following actions. The actions are described in Section 5.2. insert update deactivate activate delete withdraw move	insert
Object Identifier	A unique identifier assigned to the object.	Enter an identifier composed of the object's repository prefix followed by a unique local name (see Section 2.6).	100.50.10.1/sonarcourse1

Element name	Description	Use	Example
Location Type (Use zero or more in conjunction with Location Value)	The type of location (URL) you are providing for the object. The actual URLs are specified by the Location Value element.	For inserting a new object or for updating or moving an existing object, enter at least one of the following URL types. Otherwise, leave this element blank, or you will receive an error. Only one of each type is allowed. object advertisement runtime contact extended metadata repository	object contact NOTE – URL types are described in Section 3.1.2.1. If possible, the object URL type should be included.
Location Value (Use one in conjunction with each Location Type)	A location (URL) for a specified location type.	Enter one URL for each type you specified with the Location Type element.	http://navsearepository/downloads/sonarcours1.zip http://navsearepository/contact.html
Repository Identifier	Identifies the repository containing the object.	Enter the repository ID that was provided by your repository manager.	100.51/navsearepository
Metadata Instance Identifier	Identifies the metadata record that describes the object.	For update, delete, deactivate, and activate transactions, enter the metadata instance ID that the ADL Registry assigned to the metadata record after the object was initially registered. For insert, move, and withdraw transactions, leave this element blank, or you will receive an error.	100.3/MDsonarcourse111943
Time Stamp	The date and time when this transaction was created.	Unless a special circumstance exists, use the current time.	2006-04-26T09:51:50 NOTE – Transaction operations are time-stamp sensitive. If the transaction is manipulating an existing record, the time stamp of this transaction must be more recent than the time stamp for the existing record.

Element name	Description	Use	Example
Metadata Schema	The schema that can be used to validate the object's metadata.	This value should be: http://hdl.cordra.net/2000.2/adlreg-lom	http://hdl.cordra.net/2000.2/adlreg-lom

6 Common errors

Table 3 describes common errors that may be encountered by contributors. Appendix C of Volume 3 gives a complete error listing.

Table 3 – Common transaction errors

Error	Description	Resolution
501: Principal authentication error	Occurs when you use the wrong user name, password, or both.	Verify that you are using the correct username and password. See Section 3.5.3 for information about retrieving your user name and/or password.
1002: User group not authorized to perform transaction	Occurs when you are a member of the contributor group and try to perform a transaction (delete, withdraw, or move) that requires membership in the manager group.	If you believe that you should be a member of the manager group, contact your repository manager, who will verify your group membership with the ADL Registry Help Desk.
1006: Invalid repository specified	Occurs when you submit a transaction that contains an invalid repository ID or group ID. If a submission contains multiple transactions, only the transaction containing the invalid ID fails.	Resubmit the transaction with the correct ID.
22503: Object location should not be specified	Occurs when you include a location (URL) for a transaction other than insert, move, or update or for a second insert transaction for an object that has already been registered and has not subsequently been deleted.	Resubmit the transaction without an object location (see Section 5.3).

Error	Description	Resolution
24001: Error parsing XML	Occurs when an XML file is invalid. Invalid XML may be malformed or may use a character encoding that is not supported by the ADL Registry. All transaction files must use UTF–8 for encoding characters. This is the default encoding for XML.	To resolve a malformed XML issue, verify that your XML file complies with the XML binding for a registry transaction and the ADL Registry profile of LOM (see Volume 3). To resolve a character encoding issue, follow your XML editor's instructions for setting UTF–8 character encoding.
26001: Invalid transaction ID	Occurs when you request the processing status of a given transaction and specify an invalid transaction ID.	Verify that the transaction ID you entered matches the transaction ID that was provided for the initial transaction. If the transaction ID is correct and this error persists, contact the ADL Registry Help Desk.

7 Acronyms and abbreviations

ADL	Advanced Distributed Learning
ATC	Air Traffic Control
CD	compact disk
CNRI	Corporation for National Research Initiatives
CORDRA	Content Object Discovery and Registration/Resolution Architecture
DAC	Defense Ammunition Center
DoD	Department of Defense
DoDD	Department of Defense Directive
DODI	Department of Defense Instruction
DODIC	Department of Defense Identification Code
DSN	Defense Switched Network
ERG	Emergency Response Guide
FAA	Federal Aviation Administration
FAR	Federal Acquisition Regulation
FAQ	Frequently Asked Questions

HAZMAT	hazardous materials
ID	identifier
IDA	Institute for Defense Analyses
IEEE	Institute of Electrical & Electronics Engineers
LARC	Locally Assigned Reporting Code
LOM	Learning Object Metadata
MIME	Multipurpose Internet Mail Extensions
MSDS	Material Safety Data Sheet
NALC	Navy Ammunition Logistics Code
NAVAIR	Naval Air Systems Command
PDF	Portable Data Format
RIM	registry interface mechanism
SCO	SCORM object
SCORM	Shareable Content Object Reference Model
URL	Uniform Resource Locator
UTF	Unicode Transformation Format
XML	Extensible Markup Language

Appendix A. References

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Appendix B. Advanced searches and field reference

The ADL Registry Web site supports advanced searching capabilities, including operators to restrict or expand searches and searches restricted to specific search fields. This appendix explains advanced searches for users who wish to go beyond simple searches for metadata records. It also includes a field reference for all fields that are searchable in the ADL registry.

NOTE – The Web site includes an advanced search form that will satisfy the needs of many users (see Section 3.1.4 and Figure 15).

B.1 Advanced searches

This section explains advanced searches. It includes mandatory and optional metadata; normalization; terms, phrases, and fields; and operators.

B.1.1 Mandatory and optional metadata

Metadata records submitted to the ADL Registry must include a set of 16 mandatory descriptive metadata elements, such as title, description, and keywords (see Section 4.2). Records may contain optional descriptive elements, such as intended end user role and context (see Appendix B of Volume 3). By default, only the mandatory elements are searched. To search the optional elements, a search must specify the optionalText field (see Section B.2.1).

B.1.2 Normalization

To make searching more effective, the ADL Registry automatically normalizes certain metadata elements except those that use predefined vocabularies. Other elements, such as predefined vocabulary tokens, are not normalized. Normalization includes converting characters to lower case and removing common word endings. Converting characters to lower case provides case insensitivity. Removing word endings provides insensitivity to qualities such as pluralization and tense. This is done by stemming or stripping suffixes (-es, -s, -ed, -ing, -ate, -ble, -ize, -al, -ance, -ence, -er, -ic, -able, -ible, -ant, -ment, -ism, -ous, -ive, -ize, -e), depending on the structure of the word. For example, a search for “wound” also might return results containing “wounded” and “wounds,” because both are stemmed to “wound” at the time of indexing.

B.1.3 Terms, phrases, and fields

A search includes one or more terms and phrases. A term is a single word, such as "airplane" or "pilot." Terms are separated by spaces, and each term in a search is considered individually while building a result set. A search may specify that a metadata record must contain all of the terms or that it may contain any of the terms. Both of the following searches specify that a record must contain all three terms in no particular order:

airplane pilot training
airplane AND pilot AND training

The following search specifies that a record may contain one or more of the terms:

airplane OR pilot OR training

Terms are combined into phrases using double quotes. A phrase is processed as though it is a single term. The following search specifies that a record must contain the exact phrase "airplane pilot training":

"airplane pilot training"

Terms and phrases are case insensitive. For example, the phrases "Airplane Pilot" and "airplane pilot" are equivalent.

Searches can be restricted to specific fields, such as title, keyword, or description (as shown later in Table B.2), that correspond to specific metadata elements by specifying a field name ending with a colon and an optional space followed by the search expression. By default, when no field is specified, all mandatory metadata elements are searched. The following search searches for objects with "HAZMAT" in their titles:

title: hazmat

Fields are covered in more detail in Section B.2.

B.1.4 Operators

Operators expand search capabilities by adding functionality, such as requiring or excluding specific terms and grouping terms. The operators supported by the ADL Registry Web site are listed in Table B.1 and discussed in the following sections.

Table B.1 – Operators supported by the ADL Registry Web site

Character	Meaning	Usage
Logical operators:		
+	Requires a term to be present.	+airplane +pilot
&&		airplane && pilot
AND		airplane AND pilot
–	Excludes a term from being present.	airplane –pilot
!		airplane !pilot
NOT		airplane NOT pilot
||	Specifies that one term or another may be present.	airplane || pilot
OR		airplane OR pilot
Wildcard operators:		
?	Matches exactly one character when used within a term. Matches zero or one characters when used at the end of a term.	airpla?e
*	Matches zero or more characters.	airpl*e
Range operators:		
[TO]	Specifies an inclusive range search.	[2006 TO 2007] [airplane TO pilot]
{ TO }	Specifies an exclusive range search.	{2005 TO 2008} {a TO d}
Miscellaneous operators:		
( )	Groups two or more terms.	(airplane pilot)
^	Increases the relevance of a term.	airplane^10 pilot
“ ”	Surrounds two or more terms to create a phrase.	“airplane pilot”
~	Specifies either a fuzzy search or a proximity search.	airplane~ “airplane pilot”~5
:	Separates a field name and a term or phrase for field-specific searches.	title: airplane

NOTE – Special characters in quoted phrases are ignored. The following searches are equivalent:

"is it a plane"
"is it a plane?"
"is it a (plane)"

B.1.4.1 Logical operators

Logical operators specify how search terms and phrases are combined to constrain or expand searches. For example, in a search that includes two terms, an operator may be used to require or exclude the second term or to specify that a metadata record may contain either of the two terms. The default operator AND is used to combined terms when no operator is provided.

Examples:

The following searches are equivalent. Both "airplane" and "pilot" must be present in the record.

+airplane +pilot
airplane && pilot
airplane AND pilot
airplane pilot

The following searches are equivalent. The record must contain "airplane" and must not contain "pilot."

airplane –pilot
airplane !pilot
airplane NOT pilot

Because of the way searches that use NOT operators are processed, the following searches are equivalent. They return records that do contain "airplane" and do not contain either "pilot" or "navigator."

airplane !pilot !navigator
airplane !pilot AND !navigator
airplane !pilot OR !navigator

The following searches are equivalent. The record may contain "airplane" or "pilot" or both.

airplane || pilot
airplane OR pilot

Logical operators may precede phrases. The following search returns records that contain “hazmat” but do not contain the phrase “commercial air”:

hazmat !“commercial air”

NOTES:

1. AND, OR, and NOT must be capitalized to be interpreted as operators.

2. The characters “+”, “–”, and “!” must directly precede search terms with no intervening spaces; for example, “+pilot” not “+ pilot”.

3. If the second term in a search uses the “+” operator, the operator also must precede the first term to require that term. For example, the search “airplane +pilot” returns all records that contain “pilot” regardless of whether they contain “airplane,” but records that contain both terms are listed first.

4. A search that uses only some form of the NOT operator always returns no results. For example, the search “!airplane !pilot” returns no results. It does not return all records that do not contain “airplane” and “pilot”.

5. The ADL Registry RIM–Lite interface for tool builders uses OR instead of AND as the default operator.

B.1.4.2 Wildcard operators

Wildcard operators match unspecified characters in a term. A question mark, “?”, matches exactly one character when used within a term and zero or one characters when used at the end of a term. An asterisk, “*”, matches zero or more characters.

Examples:

The following search matches “plan,” “plane,” “plank,” and “plant”:

plan?

The following search matches “plane,” “place”, and “plate”:

pla?e

The following search matches “air,” “airy,” “airplane,” “airport,” and “Airedale”:

air*

NOTE – A wildcard may not be used at the beginning of a search term. For example, a search for ?est or *plane results in an error.

B.1.4.3 Range operators

Range operators are used to search for records that occur within specific numeric and alphabetic ranges. Range searches may be inclusive or exclusive. An inclusive range search includes the outer bounds of the range. An exclusive range search does not.

Inclusive range searches

An inclusive range search uses square brackets, "[ ]", to enclose the range values and TO to separate the values. The specified values are included in the results. For example, the following search matches "a," "b," "c," and "d":

[a TO d]

The following searches are additional examples of inclusive range searches:

[1 TO 9]
title: [1 TO 9]
date: [20071201 TO 20071215]

Exclusive range searches

An exclusive range search uses curly brackets, "{ }", to enclose the range values and TO to separate the values. The specified values are excluded from the results. For example, the following search matches "b" and "c" but not "a" or "d":

{a TO d}

The following searches are additional examples of exclusive range searches:

{1 TO 9}
title: {1 TO 9}
date: {20071201 TO 20071215}

NOTES:

1. Because metadata is converted to lower case during indexing, alphabetic range values must be specified in lower case to function properly. Specifying part or all of an alphabetic range in upper case will return no results or unexpected results.

2. Dates must be specified in the format YYYYMMDD.

3. More complex range searches, such as the following example, are accepted. However, results are unpredictable.

title: [airplane TO pilot]

B.1.4.4 Miscellaneous operators

Miscellaneous operators include operators for grouping search terms, increasing the relevance of a search term, and performing fuzzy, proximity, and field searches. These operators are discussed below.

Grouping

Grouping operators, "( )", combine multiple search terms, phrases, and operators to form more specific searches. The following search could be used to find digital objects related to pilot training for the F16 or F18:

(F16 OR F18) AND (pilot AND training)

Terms may be grouped to search specific fields. To limit the search above to the title field, use the following search:

title: ((F16 OR F18) AND (pilot AND training))

Omitting the outermost parentheses in the search above changes its meaning. The following search searches the title field for "F16" or "F18" and all mandatory metadata fields for "pilot" and "training":

title: (F16 OR F18) AND (pilot AND training)

NOTE – The examples above include AND for clarity, but the operator may be omitted because it is the default.

Relevance

The relevance operator, "^", increases the relevance of a search term. Records containing the more relevant term are displayed earlier in the search results. The following search returns records that contain either "airplane" or "pilot" or both, but records containing "pilot" are given more relevance in the order of the displayed search results:

airplane OR pilot^10

The value following the operator must be greater than zero and 10 at most. Higher values increase the relevance of the associated term.

Fuzzy searches

A tilde, "~", appended to a search term searches for word variations. This is called a fuzzy search and may be useful when a word may have multiple spellings or when you are uncertain of a word's exact spelling. The following search might return records containing "saber," "sabre," and "sober":

saber~

Proximity searches

Proximity searches limit results to words that occur within a specified distance of each other. A proximity search consists of two or more terms in quotes followed by a tilde, "~", and a numeric value. The following search limits results to records that contain "airplane" followed by "pilot" within five words:

"airplane pilot"~5

Field searches

The field operator, ":", followed by an optional space specifies that only a specific field, such as the title, is searched. Field names must be entered in lower case. The following search returns records that include "hazmat" in their titles:

title: hazmat

Phrases in field searches must be included in quotes or all but the first term will be treated as general search terms. The following search returns records that contain the phrase "hazmat familiarization" in their titles:

title: "hazmat familiarization"

Without the quotes, the following search returns records that include "hazmat" in their titles and "familiarization" in any required field:

title: hazmat familiarization

Search terms may be grouped. The following searches are equivalent and return records that include "airplane" and "pilot" in any order in the title field:

title: (airplane pilot)
title: (airplane AND pilot)

The following search returns records that contain either "airplane" or "pilot" in the title field:

title: (airplane OR pilot)

The following search returns records that include "airplane" in their titles or "pilot" in any required field:

title: airplane OR pilot

Two or more fields may be specified in a search. The following search returns records that include “hazmat” in the title field and “training” in the keyword field.

title: hazmat keyword: training

See Section B.2 for detailed information on field names.

B.2 Field reference

This section provides a complete reference for fields that are searchable in the ADL Registry.

B.2.1 Non-contributor fields

Table B.2 lists in alphabetical order the fields that are not related to specific contributor roles. The LOM [4] and transaction metadata elements to which the fields map are explained in more detail in Volume 3. Contributor-related fields are discussed in Section 0.

NOTE – Some fields in Table B.2, even though they can be used in searches, should not be used because they currently allow only required values that match every record in the ADL Registry. These fields are included for completeness and indentified in the table.

Table B.2 – Non-contributor field reference

Field	Definition
collection	Identifies an object’s grouping or category of usage. The vocabulary is open. Contributor-defined values may be provided instead of or in addition to the recommended value. The recommended value is: DOD **Usage:** collection: (DOD & NAVSEA) **LOM mapping:** /lom/classification/taxonPath/taxon/entry/string NOTE – Searching this field for the value “DOD” should match most of the records in the ADL Registry because the value is recommended. However, this field may be used to search for additional, contributor-defined values.

Field	Definition
competency	A contributor-defined value that identifies an object's competency goal. **Usage:** competency: "Some competency" **LOM mapping:** /lom/classification/taxonPath/taxon/entry/string
complies_with	The specification or standard with which an object complies. The allowed values are : SCORM 2004 3rd edition SCORM 2004 4th edition SCORM Version 1.2 S1000D V2.0 S1000D V2.1 S1000D V2.2 S1000D V2.3 S1000D V3.0 S1000D V4.0 IEEE 1484.20.1-2007 RCD other none **Usage:** complies_with: "SCORM 2004 4th edition" complies_with: other **LOM mapping:** /lom/classification/taxonPath/taxon/entry/string
date	The date an object was contributed to the ADL Registry in the form YYYYMMDD. **Usage:** date: 20071201 date: [20071201 TO 20071215] date: {20071201 TO 20071215} **LOM mapping:** /lom/lifeCycle/contribute/date NOTE – This value should correspond to the original contribution date and should not be updated if a metadata record is updated (see timeStamp entry).

Field	Definition
description	A narrative description of an object. **Usage:** description: airplane description: “airplane pilot” **LOM mapping:** /lom/general/description/string
distribution_restrictions	Any distribution restrictions associated with an object according to DoDI 1322.20 or DoDI 5230.24. The allowed values are: LR NR CP CG CD RD NF OT Distribution Statement A Distribution Statement B Distribution Statement C Distribution Statement D Distribution Statement E Distribution Statement F Distribution Statement X **Usage:** distribution_restrictions: LR distribution_restrictions: “Distribution Statement A” **LOM mapping:** /lom/classification/taxonPath/taxon/entry/string
educational_objective	A contributor-defined value that identifies an object’s educational objective. **Usage:** educational_objective: “Some objective” **LOM mapping:** /lom/classification/taxonPath/taxon/entry/string

Field	Definition
format	A list of MIME types for files present in an object or the value “non-digital”. Common MIME types include: text/html for Web pages text/plain for text files application/msword for Microsoft Word documents application/pdf for PDF documents image/jpeg for JPEG images image/gif for GIF images **Usage:** format: text/htm format: image/gif **LOM mapping:** /lom/technical/format NOTE – MIME types are a standard way of describing file formats and are reflected by file extensions. A reference for MIME type names is available at http://www.w3schools.com/media/media_mimeref.asp [5].
keyword	Descriptive keywords for an object. **Usage:** keyword: airplane keyword: “airplane pilot” **LOM mapping:** /lom/general/keyword/string
metadataInstance Identifier	A metadata instance identifier. Each metadata record in the ADL Registry is assigned a unique identifier. **Usage:** metadataInstanceIdentifier: 100.3/MDc150eca9afbbcb008bb83670b87d1f141243974576628 **Transaction metadata mapping:** /registryTransaction/transactionData/metadataInstanceDescriptor/ cordraMetadata/metadataInstanceIdentifier NOTE – A search using this field returns the single metadata record that has the specified identifier.

Field	Definition
metadataSchema	The XML schemas used to define the metadata for an object. In addition to user-defined values, the required values are: • LOMv1.0 • ADL-Rv1.0 **Usage:** metadataSchema: LOMv1.0 metadataSchema: "ANSI/MEDBIQ LO.10.1-2008" **LOM mapping:** /lom/metaMetadata/metadataSchema NOTE – A search for either of the required values will match every record in the ADL Registry. However, this field may be used to search for other, user-defined values.
objectIdentifier	A unique object identifier. Each object in the ADL Registry is assigned a unique identifier and always has at least one associated metadata record. **Usage:** objectIdentifier: 100.50.18.10/c150eca9afbbcb008bb83670b87d1f14 **Transaction metadata mapping:** /registryTransaction/transactionData/objectDescriptor/cordraObject/objectIdentifier NOTE – A search using this field returns metadata records associated with a single object that has the specified identifier.
optionalText	Searches all optional metadata elements that are not required in a metadata submission. **Usage:** optionaltext: airplane optionaltext: "airplane pilot" **LOM mapping:** None. NOTE – This field may be used to search for optional metadata that an organization is known to include in its submissions.

Field	Definition
object_type	Identifies the type of an object. The allowed values are: • asset • sco • aggregation • other **Usage:** object_type: aggregation **LOM mapping:** /lom/classification/taxonPath/taxon/entry/string
purpose	The XML schema in which the allowed vocabulary set for the taxon field is defined (see taxon entry). The value of the purpose field describes the metadata record itself, not the object that the record describes. The allowed values are: • LOMv1.0 • ADL-Rv1.0 **Usage:** purpose: LOMv1.0 purpose: ADL-Rv1.0 **LOM mapping:** /lom/classification/purpose/source NOTE – This field should not be used in a search at this time. Searching this field for one or both of the two allowed values will match every record in the ADL Registry because both values are required. Future versions of the ADL Registry may define new vocabulary sets for the taxon field. If so, additional values for the purpose field will be introduced.
repositoryIdentifier	A unique repository identifier. Each repository registered with the ADL Registry is assigned a unique identifier. **Usage:** repositoryIdentifier: 100.51/jadlrepository **Transaction metadata mapping:** /registryTransaction/transactionData/communityObject/repositoryIdentifier NOTE – A search using this field returns only metadata records associated with a single repository that has the specified identifier.

Field	Definition
rights	The XML schema in which the allowed vocabulary set for the rightsValue field is defined (see rightsValue entry). The value of this field describes the metadata record itself, not the object that the record describes. The allowed value is: • LOMv1.0 **Usage:** rights: LOMv1.0 **LOM mapping:** /lom/rights/copyrightAndOtherRestrictions/source NOTE – This field should not be used in a search at this time. Searching this field for the single allowed value will match every record in the ADL Registry because the value is required. Future versions of the ADL Registry may define new vocabulary sets for the rightsValue field. If so, additional values for the rights field will be introduced.
rightsValue	Specifies whether intellectual property restrictions are associated with an object. The allowed values are: • yes • no **Usage:** rightsValue: yes rightsValue: no **LOM mapping:** /lom/rights/copyrightAndOtherRestrictions/value
role	The XML schema in which the allowed vocabulary set for the contributor field is defined. The value of the role field describes the metadata record itself, not the object that the record describes. The allowed values are: • ADL-Rv.10 • LOMv1.0 **Usage:** role: LOMv1.0 **LOM mapping:** /lom/lifeCycle/contribute/role/source

Field	Definition
security_level	The security level of an object. The allowed value is: unclassified **Usage:** security_level: unclassified **LOM mapping:** /lom/classification/taxonPath/taxon/entry/string NOTE – This field should not be used as part of a search at this time. Searching this field for the single allowed value will match every record in the ADL Registry because the value is required. Future versions of the ADL Registry may define additional values for this field.
status	The XML schema in which allowed vocabulary sets for the statusValue field are defined (see statusValue entry). The value of the status field describes the metadata record itself, not the object that the record describes. The allowed values are: ADL-Rv1.0 LOMv1.0 **Usage:** status: ADL-Rv1.0 **LOM mapping:** /lom/lifeCycle/status/source
statusValue	The life-cycle status of an object. If the status source is set to ADL-v1.0 (see status entry), the allowed values are: query only proposed development under development development or acquisition completed program revision out of service program terminated other If the status source is set to LOMv1.0 (see status entry), the allowed values are: draft final revised unavailable **Usage:** statusValue: “under development” statusValue: final

Field	Definition
	LOM mapping: /lom/lifeCycle/status/value
taxon	Information that helps classify an object within a categorization scheme. The allowed values for this field depend on the source and value provided within the purpose field. Possible values include: ADL/DOD Object Category Taxonomy ADL/DOD Compliance Taxonomy ADL/DOD Distribution Taxonomy ADL/DOD Object Type Taxonomy ADL/DOD Security Taxonomy A contributor-defined competency taxonomy A contributor-defined educational objective taxonomy **Usage:** taxon: "ADL/DOD Distribution Taxonomy" taxon: "some competency taxonomy" **LOM mapping:** /lom/classification/taxonPath/source/string NOTE – Searching this field for one of the predefined values will match every record in the ADL Registry because all five values are required. However, additional, contributor-defined values for competencies and educational objectives are allowed for this field.
text	Searches all mandatory metadata elements when no other field is specified in a search. **Usage:** text: airplane text: "airplane pilot" **LOM mapping:** None. NOTE – Because this field is searched by default, it is unnecessary to specify the field name in a search.
timeStamp	The date a metadata submission was made in the form YYYYMMDD. This value is updated each time the associated metadata record is updated. **Usage:** timeStamp: 20071201 **Transaction metadata mapping:** /registryTransaction/transactionData/timeStamp NOTE – This field can be used to search for updated metadata records. The date field should be used to search for objects by original contribution date.

Field	Definition
title	A descriptive title for an object. **Usage:** title: airplane title: “airplane pilot” **LOM mapping:** /lom/general/title/string
version	A developer-defined version number for an object. The developer may specify any value that meets his or her organizational requirements. **Usage:** version: 1.0 version: final **LOM mapping:** /lom/lifeCycle/version/string

B.2.2 Contributor-related fields

Table B.3 includes the fields that are related to various contributor roles, such as author and object provider. Only the author field is required to have a value. All the fields map to /lom/lifeCycle/contribute/entity.

Table B.3 – Contributor-related field reference

Field	Description
author	Searches for objects by author. **Usage:** author: “ADL Co-Lab” author: “Joe Author”
content_provider	Searches for objects by content provider. **Usage:** content_provider: “ADL Co-Lab” content_provider: “Joe Provider” NOTE – This field is present for backwards compatibility. The object_provider field is preferred. To ensure that all records for a specific provider are returned, include both object_provider and content_provider in the search.

Field	Description
editor	Searches for objects by editor. **Usage:** editor: “ADL Co-Lab” editor: “Joe Editor”
educational_validator	Searches for objects by educational validator. **Usage:** educational_validator: “ADL Co-Lab” educational_validator: “Joe Validator”
graphical_designer	Searches objects by graphical designer. **Usage:** graphical_designer: “ADL Co-Lab” graphical_designer: “Joe Artist”
initiator	Searches for objects by project initiator. **Usage:** initiator: “ADL Co-Lab” initiator: “Joe Initiator”
instructional_designer	Searches for objects by instructional designer. **Usage:** instructional_designer: “Joint ADL Co-Lab” instructional_designer: “Joe ISD”
object_provider	Searches for objects by object provider. **Usage:** object_provider: “ADL Co-Lab” object_provider: “Joe Provider” NOTE – This field has replaced content_provider in current recommendations for registering objects. To ensure that all records for a specific provider are returned, include both object_provider and content_provider in the search.
publisher	Searches for objects by publisher. **Usage:** publisher: “ADL Co-Lab” publisher: “Joe Publisher”
script_writer	Searches for objects by script writer. **Usage:** script_writer: “ADL Co-Lab” script_writer: “Joe Writer”

Field	Description
subject_matter_expert	Searches for objects by subject matter expert. **Usage:** subject_matter_expert: “ADL Co-Lab” subject_matter_expert: “Joe Expert”
technical_implementer	Searches for objects by technical implementer. **Usage:** technical_implementer: “ADL Co-Lab” technical_implementer: “Joe Implementer”
technical_validator	Searches for objects by technical validator. **Usage:** technical_validator: “ADL Co-Lab” technical_validator: “Joe Validator”
terminator	Searching for objects by project terminator. **Usage:** terminator: “ADL Co-Lab” terminator: “Joe Terminator”
validator	Searches for objects by validator. **Usage:** validator: “ADL Co-Lab” validator: “Joe Validator”

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14. ABSTRACT

Great strides have been made in creating and using distributed digital objects that benefit training, education, and performance and decision aiding. Organizing learning materials into relatively small and concise learning objects promises new possibilities for developers and learners. These possibilities include widespread access to a rapidly growing library of sharable objects that can be reused for multiple purposes. The ADL Registry and CORDRA document set consists of five volumes, each covering a different aspect of the ADL Initiative Registry Project. Volume 2 provides an overview of the ADL Registry and guidance for using the ADL Registry Web site.

15. SUBJECT TERMS

Advanced Distributed Learning (ADL), ADL Registry, Content Object Discovery and Registration/Resolution Architecture (CORDRA), learning objects, Sharable Content Object Reference Model (SCORM)

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